CLEARINGHOUSE

WORKING WITH OLDER PEOPLE: A Guide to Practice

Volume I: The Knowledge Base

Department of Health, Education, and Welfare
Health Care Financing Administration
Health Standards and Quality Bureau
Parklawn Building
5600 Fishers Lane
Rockville, Maryland 20857

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Volume I: The Knowledge Base

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Revision of the series, Working with Older People, has been prepared by the Gerontological Society under contract with the Health Resources Administration, Contract No. HRA 230-76-0291.

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Overview

Originally, the aged were served because they had problems that fitted within the traditional responsibilities of social workers: financial assistance, housing, family problems. Following the passage of the Older Americans Act in 1965, and particularly as a result of matters covered by Title I, service for older people moved into broader fields than the conventional social services. This can be clearly seen in the Act's objectives outlined under Title I.

Title I--DECLARATION OF OBJECTIVES:

DEFINITIONS

Sec. 101. The Congress hereby finds and declares that, in keeping with the traditional American concept of the inherent dignity of the individual in our democratic society, the older people of our Nation are entitled to, and it is the joint and several duty and responsibility of the governments of the United States and of the several States and their political subdivisions to assist our older people to secure equal opportunity to the full and free enjoyment of the following objectives:

(1) An adequate income in retirement in accordance with the American standard of living.

(2) The best possible physical and mental health which science can make available and without regard to economic status.

(3) Suitable housing, independently selected, designed and located with reference to special needs and available at costs which older citizens can afford.

(4) Full restorative services for those who require institutional care.

(5) Opportunity for employment with no discriminatory personnel practices because of age.

(6) Retirement in health, honor, dignity--after years of contribution to the economy.

(7) Pursuit of meaningful activity within the widest range of civic, cultural, and recreational opportunities.

(8) Efficient community services, including access to low-cost transportation, which provide social assistance in a coordinated manner and which are readily available when needed.

(9) Immediate benefit from proven research knowledge which can sustain and improve health and happiness.

(10) Freedom, independence, and the free exercise of individual initiative in planning and managing their own lives.

(Older Americans Act, Title I, 1965)

This orientation is influencing the worlds of practice, policy, and planning. An obvious result has been the appearance of a new kind of service professional. The human-service worker focuses on an age-defined population having a variety of needs for services, rather than on the resolution of certain problems common to persons of all ages. These human-service workers provide a broad range of social, medical and psychological services.

This two-volume series has been designed to provide basic information to those who will be working with older people as planners, policy-makers, and human-service workers.

What do you need to know? There is consensus that you need to know about community resources, about research data, about the characteristics of the aged population you are serving, and the characteristics of the future aged. You need to have enough information to be able to help an individual and at the same time know how what you do relates to helping others in similar circumstances.

You need certain kinds of information in order to help people individually and other kinds to help them collectively. There is specific knowledge which you need to have about the category of people you are serving--knowledge in the biological, social, and psychological spheres as well as about community services.

These books are not an encyclopedia or a manual. Rather they contain material, written by experts, which will start you on the road to learning more about aging and older people. We hope it will whet your appetite for still more information.

What will this first volume tell you?

One theme for practitioners is the need for keeping their knowledge base current, thus preventing acceptance of myths and stereotypes. These blind us to the real needs of those we wish to serve. The chapter on biologic aspects tries to show the cellular, organismic and environmental dimensions of aging, which may be a process or the result of several processes. The largest chapter dwells on health aspects of aging and may help the reader begin to see relationships among structural and functional changes in the human body, diseases that may damage life, and the steps and systems that can prevent illness, preserve well-being and help make the most of the disabled individual's abilities to function independently.

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Three ensuing chapters focus on (1) the older person's psychologic functioning as influenced by changes within the body, experience, interpersonal relations, and mental illness, (2) the older person as a member of society, and (3) the older person as he or she is influenced and supported by family and work systems and by values, language and behavioral standards.

Finally, a chapter on future prospects delves into demographic projections, how plans are or can be made to meet expected demands on society in the next century, and the shape of future society and its elderly.

Volume II is organized with the idea that human services should be available in a continuum paralleling a continuum of need. Following a review of this concept of continuum of human services, we will look at four target groups, in terms of their needs and special assessment foci. Then we survey the spectrum of human services designed to assist persons in the four target groups. Since these volumes are intended as introductory, the readers should find valuable references in the Appendix to the Volume II, as well as in the bibliographies in Volume I.

Since the original series, Working with Older People, was published more than 10 years ago, our knowledge about aging, the aging population and the aged has expanded. Despite these changes, myths and stereotypes about our older population persist. Myths are those wonderful stories we tell to our children and to each other, stories with strong emotional and moral components. The myths reflect the beliefs of a society. Stereotypes are compressed and simplified belief systems about categories of people. They may be positive or negative, based on little or no data. They serve as a pair of glasses providing us with a ready-made view of the

world. We could list the many myths and stereotypes about old age in the United States and could point out their inaccuracies. In fact, it is important that we do just this and replace the inaccuracies with accurate descriptions.

It is equally important that we examine the myths themselves because of what they tell us about our society's concepts and stereotypes. We must understand our beliefs, because they govern how we define older people and their needs. Often, the myths and stereotypes we have about a particular group of people serve as a rationale for our treatment of them. If, for example, we believe that by virtue of being old people are necessarily forgetful, lonely, and sick, then certainly our treatment programs will ignore opportunities to restore or maximize their functional abilities and quality of life.

If we believe that social forces constrict the potentials of life in old age, then our programs will be designed to intervene in the social system. For example, programs of congregate housing, transportation, health maintenance, nutrition, and senior center programs can make a big difference. If, on the other hand, we believe that all of the problems of old age are the responsibility of the individual old person, then we will focus on trying to provide remedies for that individual.

The problem with stereotypes and myths is that they prevent us from dealing with people as individuals--because we see them only as depersonalized caricatures. If we provide our services on the basis of myths concerning older people's life problems rather than on the basis of what the problems actually are, our services are not meeting people's needs. For this reason, it is essential that programs and policies be based on accurate data rather than on myths and stereotypes about old age.

One of the purposes of these books, therefore, is to provide the readers with an introduction to the knowledge base which will enable them to build and implement their programs soundly.

In this overview we will contrast some myths and stereotypes about aging with the realities. We plan to point out the changing nature of our older population and the consequences of these changes for practitioners and planners.

Traditionally, age 65 has been used to define the start of old age. But, as you will read elsewhere in this volume, chronological age is a poor predictor of much of human behavior. Nor do people consider themselves old or obsolete or decrepit simply because of age. The Harris Poll,[1] for example, points out that only about half of the people asked to define when someone is old responded by giving a specific, predetermined age. The others related the onset of old age to specific circumstances and events, such as poor health, menopause, or retirement. (Interestingly enough, the percentage of those who think women and men become old before they are 60 is about the same. So much for the double standard of aging.) In other words, 50% of the public do not think chronology determines old age. Other criteria, many of them social, do define what is old.

The U.S. older population--24 million persons--is heterogeneous. The view that all are lonely, sick and neglected is certainly dismal. We know from the Harris Poll findings that the stereotype simply is not representative of that population.

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[1] This conventional age grouping covers three decades of life. The poll, sponsored by the National Council on Aging, was conducted by Louis Harris and Associates. Called The Myth and Reality of Aging in America, it is a valuable source of material about people's perceptions of and beliefs about old age in the United States.

Daily, 5,000 people reach age 65 and 3,600 in the 65 and over ages die. This conventional age grouping covers three decades of life. People in these ages exhibit considerable variety. We tend to forget that a 65 year old is likely to be quite different in physical ability, outlook, and financial resources from the person who is 90. To assume that all people over age 65 comprise a monolithic population is absurd.

Today's elderly population differs from yesterday's and will differ from tomorrow's in several characteristics. The number of elderly has grown and will continue to grow, reflecting better living conditions in earlier life. The proportion of today's elderly with at least a high school education is far larger than that of yesterday's. The future elderly population will have a far larger number of college graduates than today's. Economic status will be improved. Their lifestyles, expectations, and resources will be different, and we can expect the stereotypes to change, too.

All of us are aware of the rapidity with which the United States has changed its technology, its educational system, its economic and political systems (to mention but a few). The changing social system in turn affects how we define old age and how we respond to and treat older people. All these factors suggest that there is a social as well as biologic side to aging.

To understand the latter parts of the life cycle, we need knowledge from many disciplines of thought. The study of aging (or gerontology) is a multidisciplinary endeavor. Practitioners find that it is important to learn what psychologists, sociologists, biologists, dieticians, epidemiologists, demographers, and other specialists have discovered about the nature of aging in a society. It is also valuable to learn what those in the humanities (language, the arts, philosophy, religion, history) can contribute to the understanding of aging.

Knowledge provides a basis on which to develop practical programs and policies for now and the future as well. Too often, we deal with current situations without taking into consideration that solutions may produce future problems. For example, improved medical treatments may enable more individuals to survive into the most old ages, perhaps to outlive their economic resources and to require more supportive services to continue to live at home.

We may develop programs to meet the problems of current older people only to find that our solutions are misconceived for the elderly population of tomorrow. We must constantly be alert to such a possibility and change our approaches, accordingly. For example, many of our assumptions about the impact of retirement on older people were based on beliefs that work is an essential ingredient to a healthy and normal life. This belief was most widely held among the middle-class professional people who were the social scientists studying the effects of retirement. It was assumed that individuals were tied into a social system by virtue of their work and that loss of employment through retirement would pose a major crisis, particularly for men. It was assumed that women would not experience this kind of crisis because they were not gainfully employed outside the home. It was believed that women faced their major crisis period when their children left home. This was viewed as the equivalent of male retirement. The data indicate that neither retirement nor the "empty nest" is a major crisis for many people. Indeed, many people look forward to both events. Obviously, many elderly will benefit from retirement counseling programs. However, retirement is not an inevitable crisis for all. To assume so may be creating unnecessary anxiety.

At the same time, our assumption that retirement is more difficult for men than for women has also become outdated. Research indicates that retirement is, in many instances, more difficult for women than for men. Some women have used work to compensate for the loneliness of widowhood. Moreover, widows often need the income derived from work. Because they may have come to employment late and have had less skilled jobs and lower pay, the prospect of retirement at a low pension or Social Security income may be a more crucial issue for women than for men.

A final illustration may clarify the points that today's programs may be based on misconceptions and that current solutions may create future problems. We stress helping older people to be involved and active. The Harris Poll authors suggest that if the public feels older people are "doing something" constructive, then older people are considered active and contributing members of society. If they are not perceived this way, then the public views old people as "...worn-out, passive members of society." The authors comment:

> ...It is a significant finding therefore that larger proportions of the public at large (and the young even more than the old) attribute to most older people greater involvement in sedentary, private and isolated activities than the older public attest to personally. It is no wonder that the public at large considered "not enough to do to keep busy" a serious problem of older people, although those 65 and over deny this is a problem. [2]

The usual solution to the situation just described is to develop a program to give older people "something to do," whether or not the

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[2] Louis Harris & Associates, Inc. The Myth and Reality of Aging in America. Washington, D.C.: National Council on Aging, 1975, p. 61.

perception of inactivity is accurate, and without considering how long such a program might be an effective one. A program designed for today's older population may be inappropriate in 10 years. Tomorrow's older population will probably be healthier, better educated, more independent, and will not show advanced symptoms of aging until quite old.

For this reason, our current programs may not effectively serve the people of tomorrow. Unless programs are designed to meet real needs, unless they take into consideration the heterogeneity of today's older population and unless they have enough flexibility to change to meet future needs, all we will be doing is building services to serve our stereotypes.

Our society tends to believe that there are solutions to all problems. We tend to have a relatively simplistic picture of what constitutes a social problem, what caused it and how to solve it. If older people are hungry, we should provide them with meals; if they are poorly educated, we should provide them with an education and, if they are poor, we should provide money, but not too much of it because no one should get something for nothing. Very often we attempt to solve problems which we think people have rather than the problems they actually experience.

The study of aging processes, aging populations and the aged is a fascinating one. If the authors of these books have stimulated your interest, broadened your knowledge and caused you to think, then the revised reissue of this series has been successful. If you have learned

(a) the importances of differences between stereotypes and realities

and

(b) about the heterogeneity and complexity of the constantly-changing older populations

and

(c) some of the basic information about aging as well as where more information can be obtained

and

(d) that your perceptions of old people's problems may be inaccurate

and

(e) that single, simple solutions to social problems are nonexistent

and

(f) that today's services-solutions may be necessary, yet may cause future problems

then we believe the revised volumes will be as helpful as the original ones were.

Chapter I: Biologic Aspects of Aging

INTRODUCTION

What Is Aging?

All living organisms undergo senescence. Aging can be measured chronologically (according to the time elapsed since birth), or biologically (in terms of vital capacity and functional performance relative to same and/or other species). Although we can quantitate aging in at least these two ways, it is extremely difficult to determine which age-related phenomena are causes and which are effects of the process of senescence. Such phenomena can be observed at the level of the whole organism, its organ systems and tissues, and even in individual cells and their molecular components. By examining aging at all these levels, scientists hope to understand what senescence really is, and how to develop ways to moderate, reverse and/or prevent the ravages of old age.

A note of caution is in order before we proceed. Aging and disease may not be synonymous. With age, death rates in a population increase. The incidence of many diseases--such as cardiovascular disease and cancer --increases with age. These diseases generally take a long time to develop, and for this reason appear characteristically in older people. But this is not the whole story, for the individual himself changes with time in ways that may increase susceptibility to certain diseases.

Patterns In Nature

Diverse patterns of aging exist in nature. Scientists see this diversity among vertebrates and invertebrates, annual plants and insects. They see it through the eyes of statistics, specifically with a mechanism called the life table. Basically, a life table is a survival schedule for a defined population. Life tables can be used as gross probes for patterns of aging and hints of what causes them.

In annual plants and insects, death is the last in a rapid sequence of reproductive and developmental processes, and its proper timing is essential to the efficient completion of the reproductive act. Here we can find evidence that definite life termination processes are present, and are under effective control of genetic mechanisms which are responsive to the environmental circumstances with which the species is confronted. Other clear-cut instances of programmed aging are the life termination processes in renewable parts of organisms. The falling of leaves and fruit is the result of such programmed aging processes, as is the death of the red blood cells at a characteristic age (120 days in humans).

For all mammalian species kept under good environmental and nutritional conditions (e.g., laboratory and domestic animals, civilized people), death rates are relatively high in the prenatal, neonatal and infantile periods. They decline rapidly, reaching a minimum value for the species at an age which corresponds roughly with the species' puberty. In young adulthood, rates rise slowly. After this--e.g., from age 30 in people--mortality rates rise ever more rapidly with increasing age, by a law of geometric increase which behaves like compound interest.

For humans, for example, the mortality rate doubles about every eight years after age 30. The doubling time for the thoroughbred horse is about 3.5 years, and for the laboratory mouse it is about three months. People, thoroughbred horse, and mouse have average life-times of about 70 years, 20 years, and two years, respectively.

This increase of death rate with age is an expression of the progressive aging of organisms structurally and functionally. If each species could retain throughout its life-time the minimum death rate that it achieves at about puberty, then each species would live about 100 times

longer than it does. But people, horse, and mouse would still have about the same ratios of average longevity. Thus, the rate at which a species ages and its minimum mortality rate are related. And mammalian species under good nurture all have survivorship curves of the same sigmoid (S-shape) form, differing only in time scale.

Life tables for animals in the wild differ from those for captive animals in one important respect: death rates in the wild are much higher, due to predation, starvation and harshness of the environment. Field mice have average life-times from birth of only a month or two months as compared to three to four years for their laboratory cousins. Wild rats, on an average, live nine months while those in the laboratory survive 36 to 40 months.

Animals in the wild rarely live to ages at which senescent change becomes manifest, but the small proportion of wild animals that do reach advanced ages show the same kinds of age changes that are seen in captive animals. The same is true for primitive person. Thus, aging is not a "product of civilization," even though different kinds and degrees of civilized environment do materially affect the course of aging.

Searching for Causes

Average duration of life, or lifespan, varies among species. Scientific awareness of these large differences goes back at least to Aristotle. Active research on the biological basis of species differences did not begin until recently. The first fact to be established was that species longevity is a constitutional characteristic, closely related to such other constitutional characteristics as brain weight, body weight, and metabolic rate. Mammalian, bird, or reptile longevity can be predicted accurately if just these three numbers are known.

Why should species lifespan be governed by these three constitutional characteristics? The evidence is that two independent factors are involved. One has to do with a relation of the rate of aging to the rate of metabolism. Intuition suggested that this relationship is plausible. The so-called "rate-of-living theory" was formulated 70 years ago. The data on 85 species of mammals show an inverse relation of species lifespan to metabolic rate, thereby apparently supporting the rate-of-living theory. However, further information about the positive relation of lifespan to body temperature showed that the rate-of-living theory is false. A new theory was proposed to the effect that the rate of aging is directly related to the rate of the organism's loss of ability to produce usable energy.

The relation of lifespan to brain weight involves two considerations. The first is that the brain, in addition to its many cognitive functions, is also an "organ of longevity." Because of the complexity of brain-related regulatory functions, this hypothesis is difficult to test. The second consideration is that big-brained species are longer-lived because a big brain imposes a reproductive cost that can only be repaid by an extension of the reproductive span and, therefore, of the lifespan. This hypothesis is confirmed by data on the relation of maturation time and litter size to brain weight.

If lifespan is closely linked to constitutional and reproductive measures, then it would follow that lengthened lifespan must have evolved in close association with those other variables. Failure to do so would necessarily lead to decreased evolutionary fitness. This led to the inference that the lengthening of lifespan reflects the evolutionary perseverance and refinement of certain genetically-controlled enzymatic

longevity-assurance systems. This view flatly contradicts a widely accepted theory that aging evolved due to the action of "senescence genes." While beneficial in early life, these genes supposedly have deleterious effects after the reproductive period ends and therefore are not subject to elimination from the species by natural selection. Thus, there is at present a confrontation of two opposed theories: one holds that longevity evolved by the action of natural selection, while the other holds that aging evolved by the unselected accumulation of genes having deleterious expression late in life.

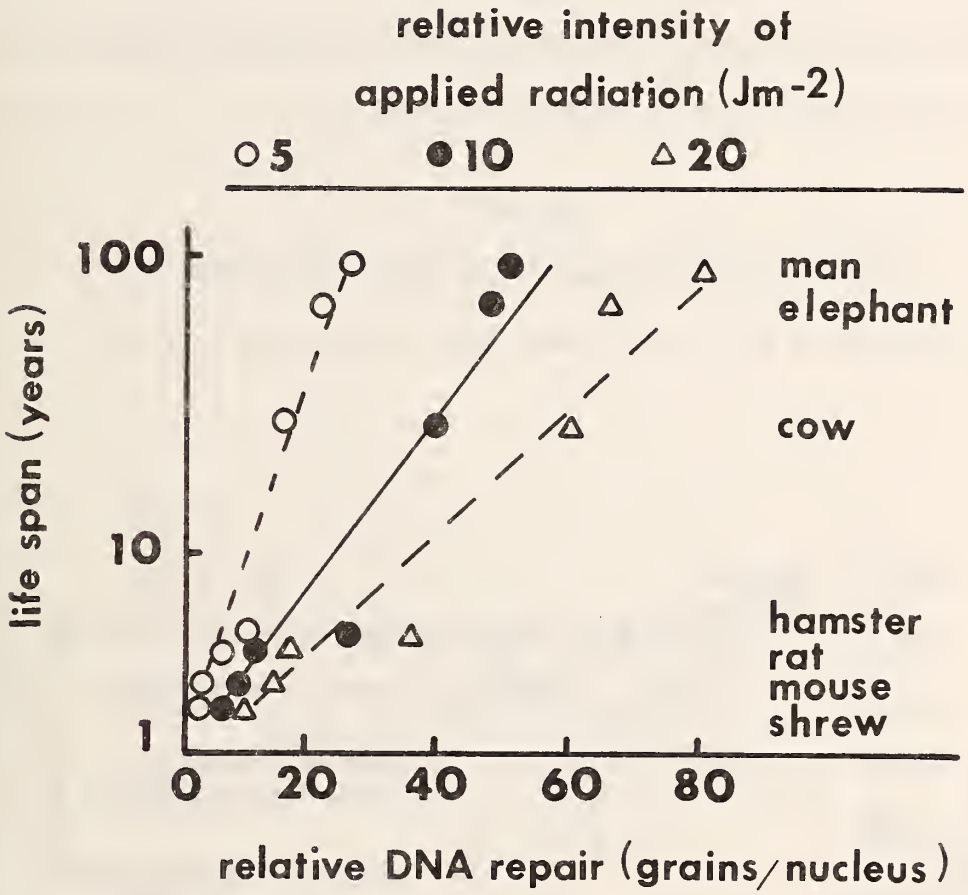
The longevity-oriented theory has stimulated an experimental search for biochemical correlates of longevity. Among the first findings are:

(1) an enzymatic mechanism for the repair of damage in DNA (deoxyribonucleic acid, basic constituent of genes) is present in the cells of different species in a degree that is highly correlated with species lifespan (see Figure 1);

(2) cells of longer-lived species are more resistant to transformation by virus (a precancerous change) and to chemically-induced mutations than are the cells of short-lived species.

Figure 1

Repair of ultraviolet radiation-induced damage in DNA molecules from species of differing maximal lifespan



(Redrawn from Hart, R. and Setlow, R. Correlation between deoxyribonucleic acid excision-repair and life-span in a number of mammalian species. Proceedings of National Academy of Science, US, 71, 1974, p. 2169)

Within a few years we should know definitely what evolved, longevity or aging. The outcome is all-important for the long-term prospects for extending human life. If we are lifespan-limited by a random accumulation of senescence genes, then perhaps the outlook is not particularly encouraging. If, on the other hand, we are lifespan-limited by the genetically determined capacity of our longevity-assurance systems, then

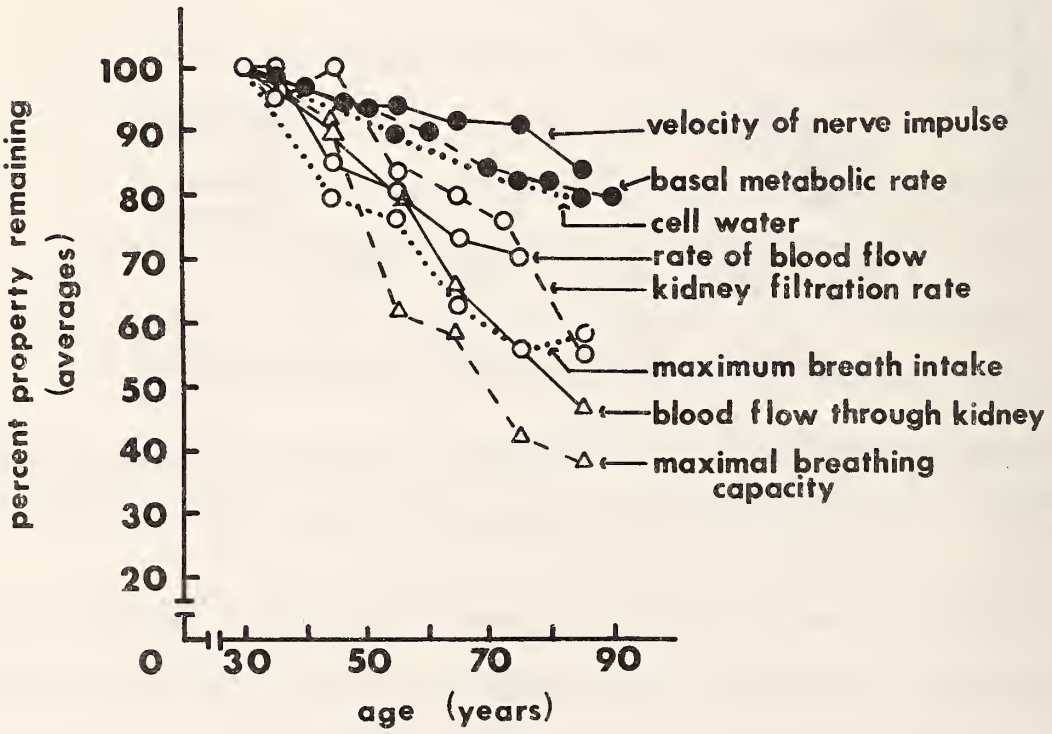
there is--at least in principle--the possibility of augmenting the activity of those systems and thereby prolonging life in a reasonably natural way.

Decline in Physiological Function During Aging

Aging of human and other mammals is characterized by a gradual decline in most physiologic activities. The chronology of the loss of certain of these functions is depicted in Figure 2.

Figure 2

Age changes in human physiologic functions, expressed as per cent of mean value at age thirty years.

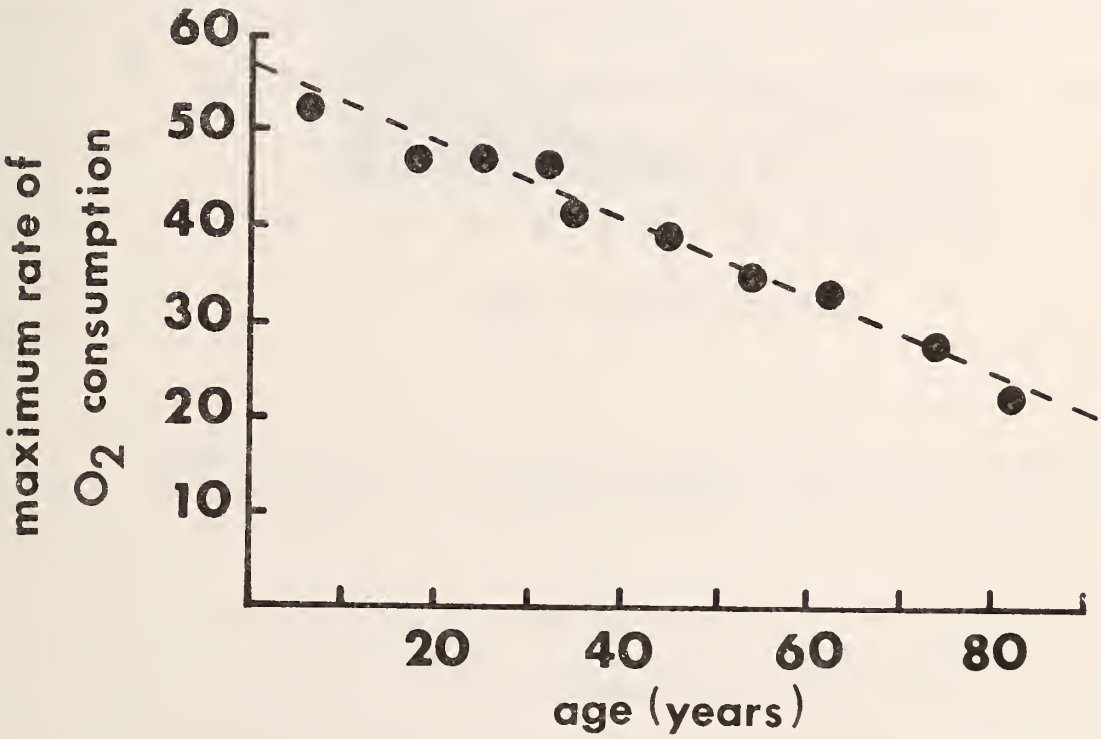


(Redrawn from Shock, N. W. The science of gerontology. Jeffers, F. C. (Ed.). Proceedings of Seminars 1959-61. Durham, N. C.: Council on Gerontology, Duke University, 1962)

Far more striking than this loss in function is the markedly less effective responses of old people and old animals to physiologic challenges when compared to those of the young. For example, the maximal rate of oxygen utilization by man during exercise (a measure of the maximal ability to do physiologic work) decreases with increasing age as shown by the data in Figure 3.

Figure 3

Age and maximal rate of oxygen consumption by man.



(Redrawn from Dehn, M. M. and Bruce, R. A. Longitudinal variations in maximal oxygen intake with age and activity. Journal of Applied Physiology, 33, 1972, p. 805)

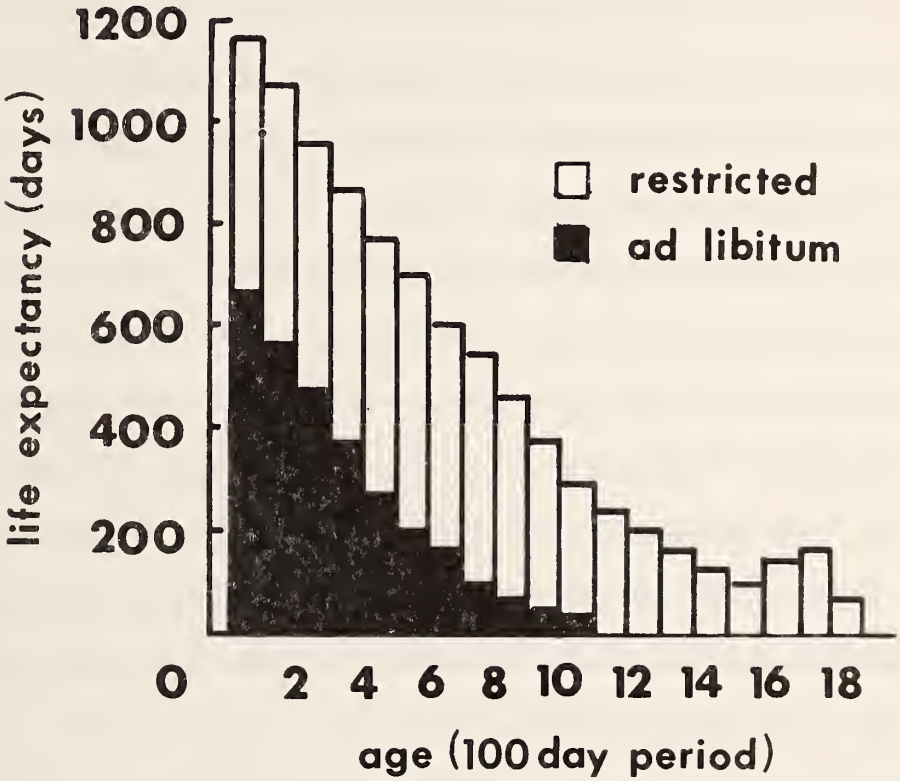
Another example is the loss with age in the ability to respond to lower oxygen concentration at high altitudes by increasing the frequency and depth of breathing. Many examples of this type of functional loss can be cited. It is probably the decrease in ability to respond to such challenges that most relates to the exponential increase in the death rate with increasing age after the onset of maturity. Viewed in that way, age-related increase in susceptibility to many diseases may well be another example of failure of the physiologic system to respond to challenges.

In considering how to explore the basis of this physiologic decline, the classic study of Clive McCay appears to provide a fruitful approach; that and similar studies showed that food restriction initiated early in the postweaning period of the life of laboratory rodents greatly increases the mean lifespan of the rodent population (Figure 4).

Figure 4

Life expectancy of rats fed ad libitum

and those restricted to 30 per cent that amount of food.



(Redrawn from Ross, M. H. Nutrition and longevity in experimental animals. Winick, M. (Ed.). Nutrition and Aging. New York: John Wiley and Sons, 1976, p. 44)

It should be noted that 'food restriction' in these studies involved lower caloric intake while insuring adequate nutritional level. Moreover, there is evidence that food restriction delays both the onset and rate of progression of diseases believed to limit the lifespan.

There is an hypothesis that food restriction may increase longevity by slowing the physiologic decline of mammals. For this reason, studies

of the effects of postweaning food restriction on the physiology of the rat were initiated by several laboratories. Some of this work is still in its initial phases, but three important leads that may relate to longevity have emerged. First, rats fed 60% the amount of food of those rats that were allowed to eat freely developed much fewer fat cells. Second, the loss in response of fat cells to glucagon--a hormone that stimulates them to release fat into the bloodstream--is either delayed, or possibly totally prevented, by postweaning food restriction. Finally, the postabsorptive concentration of fat in blood plasma (after fat cells have had a chance to absorb it) is markedly less at all ages in rats fed restricted amounts of food, and the rise in fat concentration with age is markedly reduced by food restriction. Leads like these may yield an understanding of the nature of the life-prolonging effects of food restriction. More importantly, they may provide insight into the basic characteristics of the aging process of man and other mammals, especially at the level of the whole organism and its systemic functions.

INTRINSIC CHANGES IN AGING

Cellular Aging

Although there are many reports describing age-related physiologic changes at the cell, tissue, organ, and organism level, fundamental questions about the aging process remain unanswered. The experimental design required to answer them is not clear. For example, we still need answers to such questions as whether aging is intrinsic to an individual cell or is an integrated function of the entire body.

We know that at least some of the cells in an aged organism must be senescent. It is also clear that functional failures must occur in

cells at different rates since different functional capacities (e.g., kidney, heart, and lung function) in the old organism decline at different rates. We do not know whether the changes that we see in individual cells are intrinsic to the cells or are the effects of a decline in ability to function cooperatively.

This question has been asked by many scholars for many decades. At the turn of the century, aging was thought to be the price cells paid for differentiation and that isolated cells growing outside the constraints of a highly complex organism would be able to live forever. Alexis Carrel, a biologist active in the early 1900's, and his co-workers believed that they had demonstrated this essential immortality of isolated cells by keeping cultures of chick heart cells growing for 34 years before terminating their experiments. Support for the observation of Carrel and colleagues came from the discoveries, in the 1940's and 1950's that cell lines--such as "L" cells, derived from mouse mesenchyme, and HeLa cells, isolated from a human cervical carcinoma--could be kept growing in culture without a decline in their ability to proliferate.

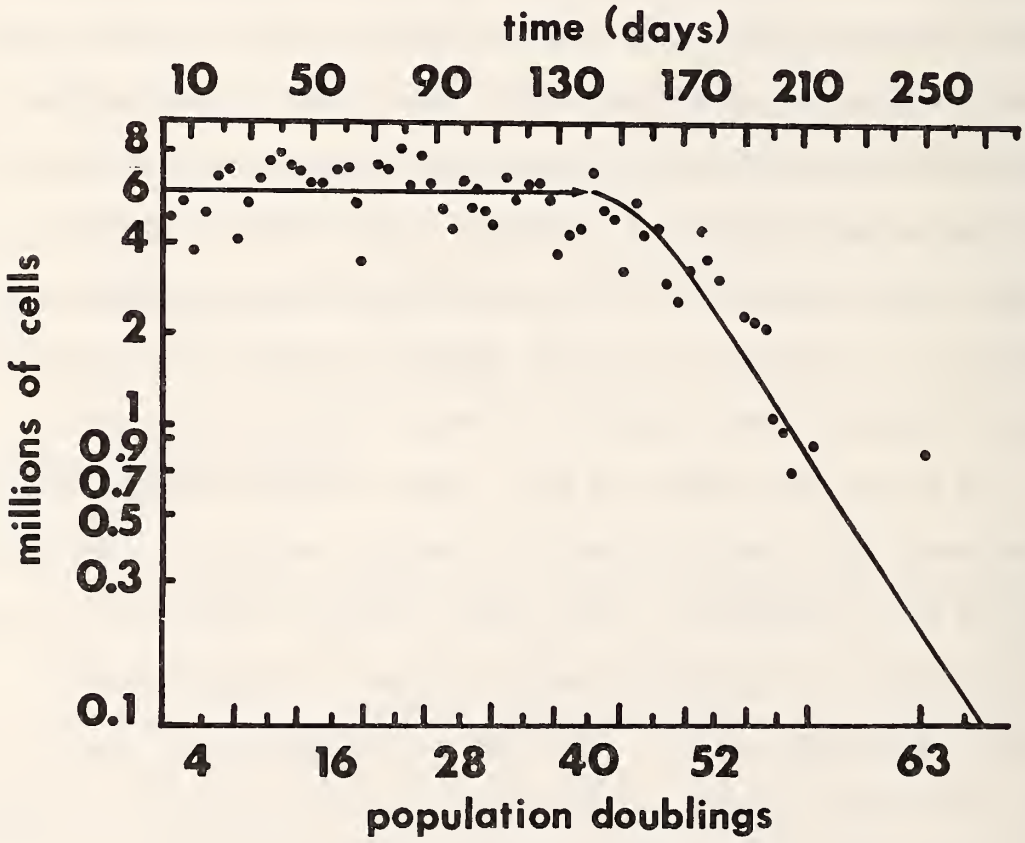
But in the late 1950's and early 1960's, Leonard Hayflick and Paul Moorhead, two scientists then at The Wistar Institute in Philadelphia, made this observation: cells from a variety of normal human tissues would proliferate in culture for various periods of time but would eventually degenerate and die. Under the culture conditions used, normal cells living outside the body were clearly not immortal. Hayflick and Moorhead proposed that this was the expression of aging at the cellular level.

Figure 5 is a typical growth curve for fetal lung cells in culture obtained by Hayflick and Moorhead. The points represent the

cell yield at each subcultivation. After establishment of the cells in culture, there is a period during which proliferation is rapid and subcultivation can be carried out frequently. This is followed by a period of declining proliferative capacity and extinction of the culture. Hayflick and Moorhead also carried out some simple but ingenious experiments to determine that this limited lifespan was not environmentally induced.

Figure 5

Growth of fetal lung cells in culture.



(Redrawn from Hayflick, L. and Moorhead, P. S. The serial cultivation of human diploid cell strains. Experimental Cell Research, 25, 1961, p. 585)

Although intrinsic timing mechanisms appear to exist in at least some types of cells in culture, it is important to consider whether or not such mechanisms are evident in living animals (*in vivo*) and whether aging in culture bears any relevance in aging in the body (*in situ*). The overall thrust of the evidence suggests that *in vivo* cells do age intrinsically. It is important to remember, however, that it may not be the senescence of one particular tissue that limits the lifespan of the animal.

Perhaps the most striking evidence that aging in cell culture reflects aging in the whole organism has come from this observation: the lifespan of cells in culture is inversely proportional to the age of the donor. For example, Hayflick showed that only 14 to 29 cell doubling occur in lung fibroblasts derived from adult human donors, whereas 35 to 63 doublings occur in cells from human embryos. George Martin and co-workers at the University of Washington in Seattle, as well as others, confirmed Hayflick's observations in 1970. They cultured fibroblasts from upper arm tissue from humans ranging in age from embryos to 90 years. They found a significant correlation between culture lifespan and donor age; that is, the older the donor, the less time the derived cells lived in culture. Thus, it is clear that age-related changes *in vivo* are reflected in the growth of cells in culture. These changes can be studied and evaluated at the cellular level.

This *in vivo* approach to the study of cellular aging has now been utilized for a variety of cell types possessing widely different functions. Particularly well-studied in relation to aging has been immunology, the study of the body's defense mechanisms against foreign substances it may contact. The cells of the immune system may attack such foreign material directly or produce special protein molecules. These antibodies combine

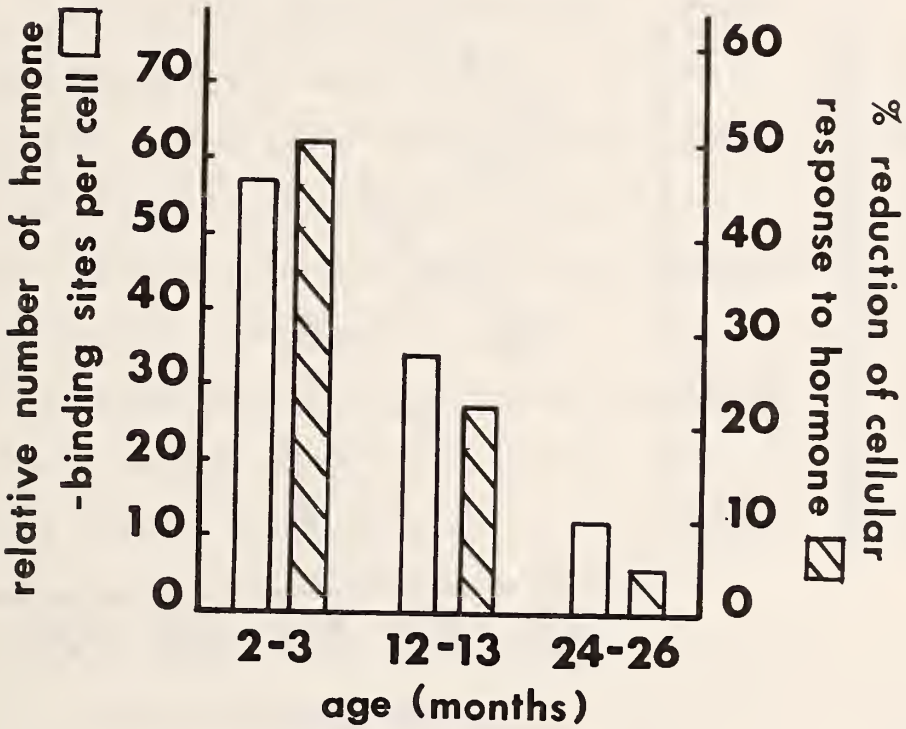
with the foreign material, leading to its ultimate removal from the organism.

The ability of immune cells to do this efficiently decreases with the organism's increasing age. This was demonstrated by experiments using mice; old immune cells were transplanted into young mice, and conversely young cells transplanted into old recipients. Very little improvement in the ability of old immune cells to combat foreign substances was seen when they were placed in the young environment. Similarly, in the old host the functional capacity of young cells was hardly reduced at all.

In vivo cellular aging also was studied for the ability of certain cells to respond to hormones, the molecular messengers that regulate most metabolic functions. Since fat cells do not proliferate and are not significantly lost during most of the adult lifespan, it is fairly certain that the age of any given fat cell is about the same as that of the whole organism. The ability of rat fat cells to regulate their nutrient utilization in response to one class of hormones, the steroids, is progressively reduced with increasing age. This appears to be due to the loss of some specific receptors or binding sites for these hormones, without which no such biological effects can occur (Figure 6).

Figure 6

Loss of steroid hormone receptors and steroid control of glucose utilization in rat fat cells during aging.

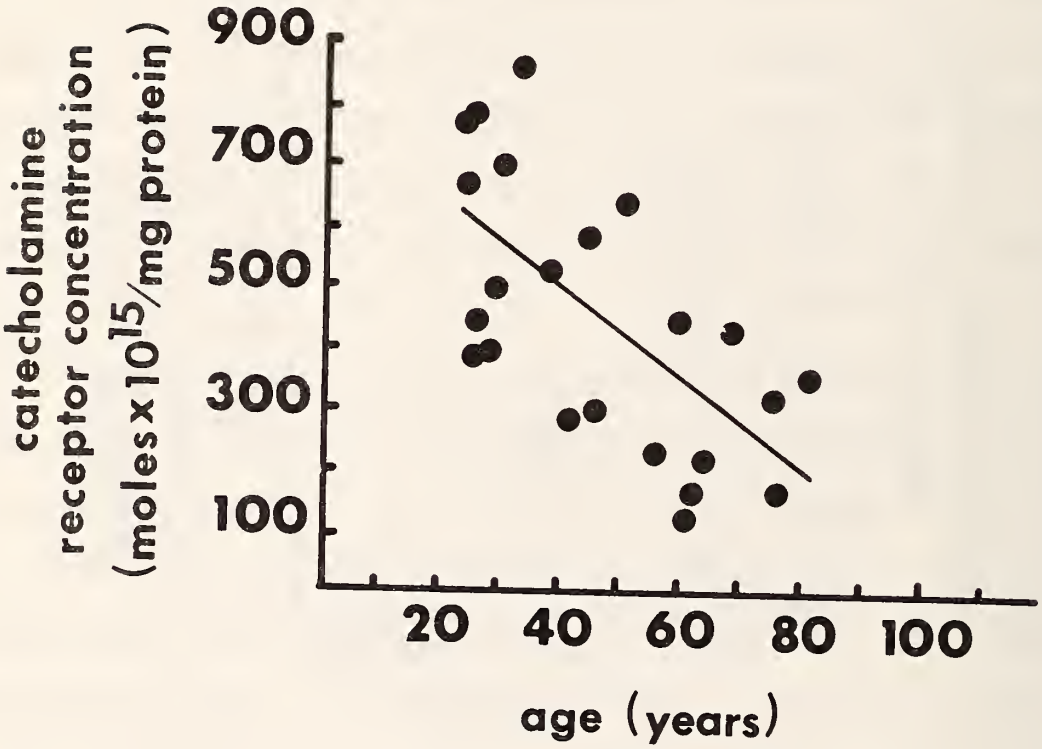


(Redrawn from Roth, G. S. Hormonal receptor and responsiveness changes during aging: Genetic modulation. In Bergsma, D. (Ed.). Genetic Effects on Aging. New York: Alan R. Liss for The National Foundation-March of Dimes, BD:OAS XIV(1), 1978)

Similar age-related loss of other hormone receptors, such as those for catecholamines (which are produced in response to stress), now has been shown for the first time in white blood cells of human donors (Figure 7).

Figure 7

Loss of catecholamine hormone receptors from human white blood cells during aging.



(Redrawn from Shocken, D. D. and Roth, G. S. Reduced β-adrenergic receptor concentrations in aging man. Nature, 267, 1977, p. 856.)

Molecular Biology

A major recent advance in gerontological research is the ability to detect expressions of aging at the molecular level. Many studies concern the nature of changes in the diverse populations of enzyme molecules found in virtually all tissues of many different animal species. In general terms, three types of questions were posed:

(1) Do the amounts of various enzyme populations change during aging?

(2) Does the biological behavior of specific enzyme molecules undergo change during aging?

(3) Is the susceptibility of enzyme populations to nutritional, hormonal and pharmacological factors altered during aging?

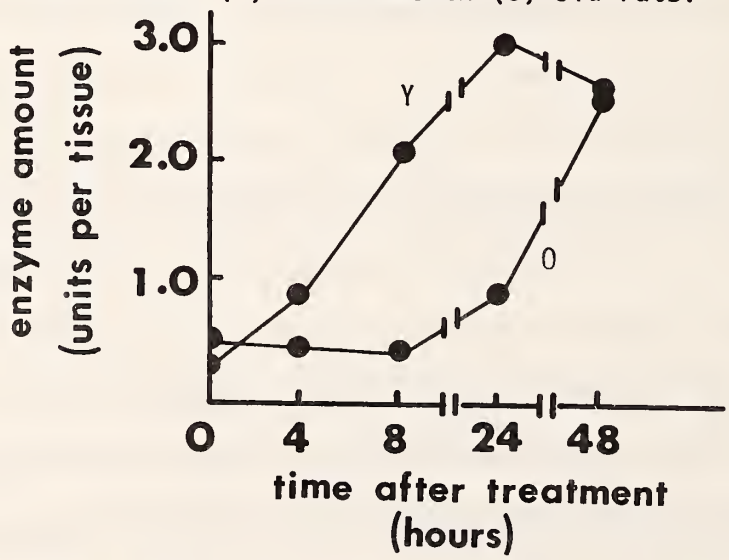
Measurement of more than 100 kinds of enzymes was reported as a function of aging in more than 1000 publications. There were attempts to identify trends of changes based on tissue location and metabolic functions. However, interpretations were hampered by differences in strains and species of experimental animals, in conditions of their environmental maintenance, and even in the methods employed by different laboratories. Only one conclusion is tenable. From an overall perspective, aging exerts no catastrophic effects on basal levels of enzyme populations.

Their functional effectiveness, however, is altered during aging. This well-documented phenomenon has provoked a great deal of discussion, as well as further experimentation. One school of investigators proposes that the data support an error theory of aging. This intriguing hypothesis suggests that the accumulation of mistakes in the protein-synthesizing apparatus of the cell could lead eventually to a catastrophe. On the other hand, the aberrant behavior of enzyme molecules that accumulate during aging could be the consequence of alterations that occur after they form. Such a sophisticated distinction is vital to the eventual comprehension of biochemical mechanisms that underlie the aging process or processes. Resolution of this question still awaits definitive experimental evidence.

Progressive impairment of adaptive response is associated with many illnesses and decrements in performance that are common to advanced age. One biochemical expression is the age-dependent decline in the capability of enzyme systems to respond to environmental changes. Enzymes from several tissues of different species were studied for response upon exposure to drugs, nutrients, and temperature. In some cases, enzyme response becomes more sluggish during aging; in others, the magnitude of response is altered. As illustrated in Figures 8 and 9, progressive sluggishness provides a direct biochemical assessment of an aging process. This phenomenon suggests a predictable timetable of declining capabilities, and it may offer ultimately the opportunity to determine the sequence of the molecular events that are responsible.

Figure 8

Time course of change in the hepatic enzyme, glucokinase, following administration of glucose to 2-month (Y) and 24-month (O) old rats.



(Redrawn from Adelman, R. C. An age-dependent modification of enzyme regulation. Journal of Biological Chemistry, 245, 1970, p. 1032)

Figure 9

Relationship between rat age and the time required to provoke change in hepatic glucokinase by administration of glucose.

(Redrawn from Adelman, R. C. Age-dependent effects in enzyme induction--a biochemical expression of aging. Experimental Gerontology, 6, 1971, p. 75)

EXTRINSIC FACTORS

Nearly every environmental factor can influence the length of life of an organism, as well as its health. Among the most thoroughly studied is the effect of temperature on cold-blood animals. Reducing ambient temperature tends to reduce metabolic activity and extend life-span. Radiation--both ionizing types, such as X-rays and cosmic rays, and ultraviolet light--may damage the organism when applied in unusually large doses. For example, animals exposed to heavy doses of X-rays show cell loss and hardening of arterioles; some such accelerated changes resemble those of aging. Chronic exposure to ultraviolet light produces injury to the skin and its underlying layer of stiff collagen. In solar elastosis, the underlying collagen is replaced by elastic material, producing the characteristic wrinkling of old age.

Although many living systems can take care of toxic substances in certain quantities, larger concentrations may cause death. Air pollutants, some pesticides, and substances added to food may have toxic effects in people or animals.

Probably the most important chemical factor affecting longevity is the nature of the diet. The effect can be shortening or lengthening lifespan. As noted previously, substantial dietary restriction of young animals extends lifespan. Too much food will shorten it by taxing certain organ systems or by fostering such diseases as atherosclerosis.

The omission of any essential dietary nutrient--a vitamin or basic protein, for example--will result in malfunction of the organism. In parts of the world with chronic food shortages, undernutrition is an important cause of shortening the lifespan. In most industrial countries, overnutrition is a problem. Diets high in saturated fats apparently produce age-associated pathologies and raise the incidences of heart disease and stroke. Interestingly enough, such diseases occurred relatively rarely in Europe during World War II; their incidences rose in the postwar prosperity.

Other extrinsic correlates of long human life include extent of education and such habits as cleanliness, rest, exercise, and general psychologic outlook. On the other hand, shorter lifespans are associated with intake of tobacco smoke and drugs. Extreme alcoholism, as is well known, produces deterioration of the body; the liver may harden because of alcohol-induced cell loss and replacement by collagenous tissue. Such considerations lead us to view the cultural values that direct behavior as extrinsic factors in longevity; for example, some religious groups have strictures against excessive use of alcohol and these populations exhibit longer average span of life.

No review of extrinsic factors would be complete without mentioning occupational hazards, accidents elsewhere than in the workplace, and exposure to disease-producing pathogens. While average human lifespan has grown remarkably with improvement in hygiene, public sanitation, development of antibiotics and immunization practices, the development of automobiles and use of toxic materials in an industrial society may be cited as factors that offset lifespan improvements in some population groups.

SOCIAL IMPLICATIONS OF BIOLOGIC INFORMATION

Among relevant contributions that the biological sciences can make to the daily existence of elderly people is that of practical knowledge, the information that may help people to evaluate habits and lifestyles and modify them. Changes in nutrition, drug-taking, exposure to stress, and expectation of performance at different ages probably would flow from identification and better understanding of life-improving factors.

Much scientific work remains to be done in each of these areas. For example, we already know from work done on experimental animals and observation of long-lived peoples that diet does play a crucial role in maintenance of health and well-being. While the relationship between nutrition of the fetus and mother (with important implications of early normal growth and development) is now well known, little is known about effects of fetal nutrition on health and function in later adult life. Certain changes in behavior, decreased learning capacity, some types of senility, depression and disorientation may well represent, in part, nutritional deficiencies. What is required, therefore, are carefully designed, controlled studies to examine effects of life-long dietary regimens on long-term health, lifespan, disease incidence and aging processes.

Similarly, much remains to be discovered with regard to other areas of concern. Which medicinal treatments, in what quantities, are most appropriate for the elderly? What mechanisms underlie the illnesses which rapidly attack the elderly shortly after exposure to such stresses as change in mental state, employment, or home? How can we develop batteries of tests which are capable of providing rational criteria for retirement, license to drive, and eligibility for insurance?

It is often necessary in basic research to isolate a question in experimental animal models, and to search for alternate solutions which may then be integrated into the whole of human function and behavior. By and through research, we can learn to utilize the potential of older people's energies and talents.

CONCLUSIONS

The manifestations of aging are visible at every level of biologic complexity. The best documented among these is a generalized decline in functional capacity. More recently recognized are a variety of measures which correlate with species longevity. The immediate goal of biological gerontologists is the elucidation of the precise nature of this decline and of species differences. Whether aging is due to single or multiple causes also must be determined.

To these ends, gerontologists seek to apply the knowledge gained by physiologists, biochemists, immunologists, cell and molecular biologists, and others. Ultimately, such information may lead to ways of extending the period of maximal physiologic function and to postponement or prevention of the detrimental features of the aging process.

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This volume presents current information from all areas of biological research concerned with aging.

Chapter II: Health Aspects of Aging

Section 1. Structural and Functional Changes

INTRODUCTION

This section on structural and functional changes in human aging is necessarily a catalog rather than an explanatory narrative. The reason is that biomedical science has yet to knit together into a comprehensive explanation all the major changes that are observable in human aging.

Nonetheless, a catalog of these changes may be illuminating. In some aspects of human physiology and anatomy, we know a great deal about the changes that come with age. In others, we know relatively little, if anything. One difficulty is obvious: we may not gather information from human populations with the sacrificial methods used with animal populations. Another problem is that the human body ages over a span many times that of experimental animals like the rat. Studies of human aging may require work over the careers of a generation or two, or more, of scientists.

Finally, one must note that it is difficult to dissociate the effects of environmental disease factors from those of intrinsic aging. Where do we draw that finest of lines between the growing vulnerability of the human organism and the onset of disease? When we look at the cells of the aged and young human being, are we seeing differences attributable to age or to disease or to genetic and other factors?

Since aging is conceived of as universal among human beings, any process that affects only a segment of the human population has been considered to be a disease. Aging itself must be considered "normal," and not a disease. How then to explain the widespread, though not universal, occurrence of such diseases as cancer and cardiovascular ailments? We now enter a realm of speculation, based on the catalog of observations. For example, we may assume that every individual has a

potential for cancer. Cancer does not always appear because of defense mechanisms in the body. However, if, in aging, the body loses strength in these mechanisms and if the body encounters a strong enough cancer-causing agent, the disease will appear. Some theorists believe that the appearance of at least some cancers in the elderly reflects the diminishing strength of the immunologic system.

Disease and aging may relate in another way, exemplified by atherosclerosis, the hardening of the arteries due to accumulation of fatty substances on the arterial lining. Many factors may be operating. The rate of atherosclerotic development has been linked to such risk factors as high blood pressure, excessive sugar and lipid (fat) in the blood. You can see that diet, the organs involved in sugar metabolism, and the individual's reaction to stresses may play roles in atherosclerosis. The result may be a fatal blockage or occlusion of a major artery feeding the heart muscle, producing a heart attack.

Whether an individual dies of a vascular complication, cancer, or some other cause depends on the vulnerability of the particular body system or systems under challenge. The risk of dying from each potential cause of death and the likelihood that more than one of the risks will be present increases geometrically with age. The phenomenon of the one-horse shay, where all the parts wore out at precisely the same time, is as improbable in biology as it is in mechanics.

As you read through the catalog, you may find striking the fact that there is a great variety in functional and structural changes with age. In some organ systems, change with age is relatively slight; in others, dramatic. Peculiarly, dramatic structural changes may not necessarily produce dramatic functional losses, to the extent of jeopardizing an

individual's survival. Also striking is the extent of the human body's reserves; the body may lose much but plenty may remain to keep it going comfortably, if not overstressed.

Bear in mind, too, that changes observed here and there in the body must be judged for their health significance in a holistic, or whole-body, context. Some individuals manage well with a disability; others do poorly. A catalog of decrements, then, must be balanced with insights into psychosocial conditions and other factors.

CELLS AND TISSUES

From birth to maturity, the sum total of biologic changes is incremental. But from maturity onward, the totality shifts and becomes decremental. These developmental changes -- incremental and decremental -- are influenced by the processes of disease and injury. During the past quarter century, an increasing body of knowledge indicates that aging is a process or set of processes inherent in the organism and probably independent of, although influenced by, the environment. A major problem -- perhaps the most perplexing of all problems -- is to identify the changes due to age alone and to distinguish them from the specific processes of disease or injury. The scientist B. L. Strehler has advanced the idea that aging has four characteristics. Aging is universal, progressive, decremental, and intrinsic. These characteristics may be taken as a starting point for discussion of structural and functional changes.

There is a gradual loss of cells as the individual ages. The somatic cells (those not involved in sexual reproduction) can be characterized as those that continue to divide (mitotic cells) and those that never divide (postmitotic). Postmitotic cells, such as nerve cells, are

not replaced when lost; their number decreases with age. Those cells that remain show age-related changes: they tend to become larger and the structural pattern of the tissues they make up becomes increasingly irregular. While the total number of cells in the body may decrease by 30% between youth and old age, the mass of these cells decreases by a smaller amount.

The number of metabolically active cells diminishes. This is paralleled by a decrease in intracellular water. Water outside the cells and plasma volume remain constant. An increase in body fat with age equals or exceeds the decrease in cell mass and may obscure the change in compositional distribution of the body. In sum, the body is drying out somewhat and, while losing cells, doesn't look thinner because fat is replacing the cells.

A fairly uniform series of age-related changes is found in the matrices of connective tissue outside the cell. This tissue, along with bone, gives the body its framework. What essentially happens is that the connective tissue, made up of collagen fiber, gets tougher. The collagen gets denser, affecting the ability of nutrients and wastes to pass through tissues and of lungs and blood vessels to remain elastic. Another component of the connective tissue matrix, elastin, becomes fragmented and calcified with age, also reducing tissue elasticity.

ORGAN SYSTEMS

We shall now consider briefly some organ-system changes. We have more information about changes in some organ systems than we do about changes in others. As noted before, it is not always clear whether the changes are attributable to aging processes or disease processes. Some

changes are amenable to treatments or to preventive interventions. For example, the ability of the lungs to clear themselves of normal secretions tends to diminish with age; the surgeon must take this into account in order to avoid post-surgical problems -- especially those that may lead to prolonged bedrest, itself highly risky in the elderly.

Cardiovascular System

The heart muscle is believed to enlarge as a result of age itself. The enlargement may represent an attempt of the organ to compensate for the loss of heart-muscle cells. These, being postmitotic, are not replaced when lost. To maintain function, the remaining bundles of muscle tissue enlarge. In human beings, the left ventricular wall of the heart may be 25% thicker at age 80 than at age 30. In the rat, the 24-month-old will have a heart enlarged 8% to 15% over that of the 12-month-old rat. Among other changes in the heart structure, the valves become thicker and stiffer with age.

The normal electrocardiogram shows little change with age. However, pathologic changes in the heart accumulate over time and show up on the electrocardiogram. These changes should not be confused with normal manifestations of aging. The heart's ability to move blood (cardiac output) drops with age, and this is considered normal to an extent. The decline in pumping volume means that blood flow to various organs is reduced, but not to the same degree for all organs. Flow to the brain and vessels serving the heart muscle itself is reduced less than flow to most other tissues. These flow changes are important clinically. For example, the fact that blood flow through the kidney is less in old age must be borne in mind by the physician when prescribing drugs (such as certain antibiotics) that are excreted by the kidney. The dosages for

the elderly may need to be much less than for the young patient.

Turning to the arteries, we see that they become less flexible with age, which tends to make the heart work harder. The loss of resiliency, which is independent of the atherosclerotic process, stems from fragmentation of arterial elastic fibers and from calcium deposition. At the same time, the amount of collagen in the vessels grows and the cross-linking of collagen fibers into larger and larger bundles also undermines the flexibility of the vessels. Old arteries have half the stretch of young ones.

With increasing vascular rigidity, it is not surprising that blood pressure increases with age, both the systolic component -- the pressure measured when the heart contracts -- and the diastolic component, the between-beat pressure. In the smaller vessels at some distance from the heart, there is increased resistance to blood flow. This is a danger to tissues of the legs. The aorta, however, enlarges to compensate in part for the loss of elasticity elsewhere in the cardiovascular network. If pressures in this main artery leading from the heart become too intense, there is danger of a fatal rupture.

Excretory System

Each human kidney contains about one million excretory units (nephrons) at birth. These increase in size, but not in number, until maturity. A few nephrons normally are lost during maturation. Then the loss accelerates, so that between the ages 25 and 85 their number decreases by 30% to 40%, still sufficient to maintain normal human activity.

The remaining nephrons enlarge in an attempt to do the excretory work. Despite the enlargement, the net weight of the kidney declines

about 30% from maturity to old age. With reduction of the number of functional units, the excretory capacity of the kidney also declines proportionately.

Respiratory System

There are probably several hundred viruses that can cause upper respiratory infections. During childhood, immunities are built up against the common agents. The frequency of colds decreases from five or six per year to about two in early adulthood, and to one per year in old age. However, when infections (such as influenza) do occur, there is a rapidly increasing mortality with age.

The back-to-front diameter of the chest increases with age. There is a progressive humping (kyphosis) of the spine and rounding of the shoulders. The compliance of the chest wall and the force of the expiratory muscles is reduced. The aging lung becomes increasingly rigid.

Between the third and ninth decades of life, the ribs elevate and the diaphragm flattens, lessening the lungs' ability to move air. At rest, the lungs of older persons are more inflated than are the lungs of younger persons. Even with forced expiration, a much larger amount of air (residual volume) is left in the lungs of older people. Since oxygen requirements decline with age, these changes produce no symptoms of distress in the absence of disease. It is hard to predict how these normal changes will affect the ability of an individual's lungs to cope with stress. However, any reduction in the lung's capacity to move air may be troublesome. We do see a nearly linear decrease in maximal breathing capacity between the third and ninth decades.

The increased rigidity of the chest wall and the decreased strength of the expiratory muscles contribute to weakening the propulsive effectiveness of the cough. This is an extremely important clinical consideration because it lessens the ability of the lungs to clear themselves of normal secretions. Since these secretions are excellent growth media for microorganisms and since they serve to obstruct the airways, they enhance the potential for respiratory complications during and after surgery.

Gastrointestinal System

Despite a wide variety of functional change described or implied, little anatomic change in the gastrointestinal tract has been found.

In the stomach, inflammation of the lining and development of polyps become more common with age. Although it is believed that atrophy occurs in the small intestine, there is no objective documentation.

In the vermiform appendix, lymphoid tissue shrinks and hardens; the lumen (hollow-core) progressively closes from tip to base. Appendicitis becomes less likely. Diverticulosis of the sigmoid colon, an out-pouching of the colon wall, occurs in at least one-third of all individuals over age 60. These pockets can develop inflammatory reactions in much the same manner as appendicitis.

The gastrointestinal tract shows lessened motility with age. Studies of esophageal motility in nonagenarians show that esophageal peristalsis followed only 50% of swallows, compared to 90% in young individuals. Few reports of age-related changes in gastric and small intestinal motility were found, and studies in large bowel motility appear to be limited. Fecal incontinence becomes more frequent with age and may occur in 20% of hospitalized geriatric patients.

Certain secretions diminish. The volume of saliva, both stimulated and unstimulated, is greatly reduced, and averages only a third of that produced in youth, contributing to the dry tongue of old age, and possibly to reduced taste sensation. The secretion of both free and total gastric acid decreases with age. This is most marked in association with atrophic gastritis (inflammation of the thinned-out stomach wall), the incidence of which rises with age. This type of gastritis could be either an aging or disease process. Further work is necessary to determine if there is a physiologic decrease in pancreatic enzymes and related alterations in digestive processes. Absorption, the most critical GI tract function, has not been well defined in terms of aging.

The liver, gallbladder, and pancreas present a varied picture. The liver shrinks with age. One postmortem study of 400 human livers showed the average peak weight was 1929 gm. in the fourth decade of life and declined to 1000 gm. by the tenth, the sharpest decline occurring after the sixth decade. The average weight remained constant at 2.5% of total body weight until the seventh decade and then dropped to 1.6% by the tenth. Cellular changes were so characteristic that old and young livers were identified readily by microscopic examination.

It is not clear whether blood flow through the liver and other viscera declines for local as well as general reasons or solely because of the decline in total cardiac output with age. Since the liver affects metabolism of drugs and other substances carried by the bloodstream, this important issue still requires critical evaluation. The liver clearly seems affected by age in other ways: reduced serum albumin may represent failure of the liver to maintain youthful levels; the rise in globulins may

represent accumulated immune experience.

Biliary stones (gall stones) occur more often with age. They are estimated to be present in the gallbladders of 10% of men and 20% of women aged 55 to 65. The frequency approaches 40% by the eighth decade. Apparently, the normal mechanisms which prevent stone formation (i.e., cholesterol stabilization and absorption) become progressively less efficient with age. While the presence of stones usually creates no problems by themselves, they may aggravate other GI problems.

Some investigators report a significant loss with age in the weight of the adult human pancreas, but others do not. While the pancreas seems to produce less enzymes, the level apparently is enough for normal digestion.

Endocrine System

It is not possible to summarize the voluminous material on the relationship of aging and the hormones. In a discussion of this kind, we shall mention only the pituitary and the pancreas.

The weight of the pituitary gland may decrease 20% in extreme old age, but the significance cannot be determined because the patients examined also had prolonged terminal illnesses. However, there is a marked decrease in the blood supply and number of new cells, an increase in connective tissue, a change in the proportion of cell types, and a definite disorganization of the cell structure. The concentrations of hormones controlling the thyroid gland and adrenal cortex, growth, and one phase of the ovulatory cycle, seem unaltered. But the brain's production of follicle-stimulating hormone increases in post-menopausal women, reflecting a failure of the ovaries to function. The excess of this hormone is believed responsible for symptoms of the menopause.

There is a constant decrease with age in the body's ability to handle a sugar, or glucose, load. The concentration of sugar in the blood of a 75-year-old person, when measured 2 hours after ingestion of a sugar load, will be, on average, 30% higher than that of a younger adult. By youth-based standards, more than half of these older individuals would be considered diabetic, that is, in danger of the vascular and other complications that accompany inability to process sugar. The extent to which the rise of blood-sugar values with age reflects disease rather than normal aging is not known. The lack of good indications for treatment is troublesome to physicians and others caring for the elderly. One strategy is to select for treatment those individuals whose blood-sugar responses are poorest for their age group (e.g., those in the 7% of an age group with the highest blood-sugar levels after a test load is given).

The Blood

Remarkably little change with age has been reported for blood and its components. Until at least age 80, there is no decrease in the blood volume, despite the decrease in active cell mass of the body. There are only very subtle changes in the red blood cells. Although anemia is frequent, it is always secondary to disease.

Red cell survival time is normal. The number and distribution of the white blood cells (leucocytes) are unchanged. No change in platelet structure, number or function has been observed except for a possible increase in adhesiveness. There is no evidence of inadequate or excessive clotting factors.

Muscles

Composed of postmitotic cells, muscles depend upon stimulation by motor neurons for survival. A progressive loss of muscle strength

is characteristic of aging. There is a significant linear decrease in the number of muscle cells with age. Muscle cells are lost at a faster rate than nerve cells.

Joints

Surfaced with cartilage, joints show major deterioration as early as the third decade. These changes, probably the result of cumulated trauma, result in fraying and chipping. As the cartilage is eroded, bone makes direct contact with bone and this results in one form of degenerative arthritis with pain, crepitation, and limitation of movement. A loss of water from cartilage results in narrowing of the joint spaces, particularly of the intervertebral discs, and contributes to the loss of height.

In another form of osteoarthritis, there are irregular bony overgrowths at the edges of joints, presumably at sites of trauma. When this occurs about the hip, the femoral head may become trapped, painful and immobile. This is the most common cause for hip replacement.

Bone

Bone is a complex tissue which undergoes change throughout life. Starting at about age 40 in both sexes there is a shift from growth in bone mass to a progressive decrease. The characteristic feature of reduced bone mass, or osteoporosis, is loss of both bone salts and the supporting protein matrix. These changes affect reduction of about 25% of the bone structures in women and about 12% in men. Thinning of bone predisposes to fracture, particularly of the hip, vertebral body, shoulder, and wrist, and particularly in women.

The considerable loss of height with age is difficult to evaluate without longitudinal data. If the span of the outstretched arms, which does not change with age, is used to estimate mature height, the average

loss from the maximum in youth is 1.5 inches by ages 65 to 74, and 3 inches by ages 85 to 94.

Skin, Hair and Nails

Changes in the skin and hair are the most characteristic manifestations of aging, especially wrinkling and sagging of the skin and greying of the hair. These changes are accentuated in the exposed areas, and are inversely proportional to the amount of pigmentation, but are present to a lesser degree even in protected areas.

Changes in the epidermis (outer layer of skin) are characterized by thinning of the cell layers. The remaining cells reproduce more slowly, and healing is delayed.

The dermis (inner layer) also undergoes thinning, largely due to reduction of subcutaneous fat. Blood flow in these tissues decreases and vascular fragility increases, resulting in frequent hemorrhages under the skin. These changes, including reduced elasticity and the loss of subcutaneous fat, contribute to senile wrinkling. The sweat glands are decreased in size, number and function, resulting in increased skin dryness.

Greying of the hair is due to a reduction in the rate of pigment production by the hair follicle. Genetic factors control the age of onset, with considerable racial variation. The total amount of visible hair is determined more by the relative proportion of active as opposed to resting follicles than to their absolute number, except late in life. In white males, the production of scalp hair decreases, but the hair of the ears may increase, and that of the beard is relatively unchanged. Post-menopausal women have decreased hair in the pubic and armpit areas. In white women, there are changes in hormonal balances that may cause

facial hair to grow. However, in all individuals the rate of active hair growth decreases with age. So does the rate of nail growth.

Nervous System

The complexity of structure and function of the nervous system has made it difficult to develop a comprehensive view of the aging process in that organ. Only a few components will be presented here.

Nerve cells are postmitotic; when lost, they are not replaced. Studies of brain weight have shown a small but consistent loss of 6% to 7% from maximum at maturity to advanced old age. There is a significant loss of brain cells, which may be 45% in some cortical areas.

Despite these losses and other changes that would seem sufficient to account for senile dementia, intellectual function seems to be sustained in most persons. The brain appears to have a great reserve capacity to perform adequately in the face of structural damage.

Sleep is a phenomenon of great biologic and clinical importance. Four levels of increasing depth can be identified by electroencephalographic criteria, the most deep being level 4. An additional level associated with rapid eye movements, known as REM sleep, is borderline in depth, but is associated with the majority of dreams and has multiple unique physiologic characteristics.

In infancy, deep levels 3 and 4 predominate, and arousal is rare throughout the sleep cycle. With aging, levels 3 and 4 become less prominent, and brief arousals more frequent. By old age, there is little level 4, and there may be numerous brief arousals, although the total sleep time is only slightly reduced from young adulthood. It is this frequent arousal that gives the impression of sleeplessness, even though in most instances actual sleep loss is minimal. There is little reduction in REM sleep.

Sensory Organs and Sensation

Visual acuity decreases with age. The actual amount of visual loss is variable. Most of it is due to cumulative damage to the transparent portions of the ocular system. However, there is also loss of the extent of the visual fields, decrease in the speed of adaptation to darkness, elevation in the threshold of light perception, and a greater proportionate loss of visual acuity in dim illumination. The pupil gets progressively smaller and responds less quickly to changes in light intensity. By age 85 only one-third of elderly persons have pupils that respond to light.

Between ages 40 and 45 years, almost all individuals require corrective lenses in order to read and perform tasks requiring accommodation to near vision. It is not known whether the more or less complete clouding of the natural lens of the eye (cataract formation), which markedly increases in frequency with age, is a pathologic process or a manifestation of aging that occurs sooner in some persons than in others.

Audiometric studies indicate that the mean pure-tone threshold increases with age at all frequencies and for both sexes. Most individuals over 60 have lost their serviceable hearing for frequencies above 4000 cycles. However, the ability to identify words is affected more than would be expected by the loss in frequency response. Presbycusis, the changes in hearing that come with age, begins with loss of word-discrimination. The auditory reaction time increases and becomes behaviorally significant after 70 years.

The number of taste buds in the tongue decreases from an average of 248 in children to 88 in individuals 74 to 85 years of age. Moreover, half of the buds in the older group were stunted, so that the loss of functional units was probably 80%.

Sex-Specific Changes of the Elderly

One of the myths hitherto associated with popular conceptions of the aging process was that older persons had no interest in and certainly did not participate in sexual activities. All recent research indicates that this is indeed a myth.

Masters and Johnson, while observing important physiologic changes in sexual response that occurred during the aging process, nevertheless concluded that there "is no time limit drawn by the advancing years to female sexuality" and under proper physical and emotional conditions for the male "there is a capacity for sexual performance that frequently may extend to and beyond the 80-year-old level." The Kinsey studies similarly reported little evidence of change in sexual capacity with age.

There are differences in sex-specific changes occurring during the aging process, which will be examined here in terms of the differences that separate male and female sexual physiology.

As women approach their middle years, changes in body features are observed: The breasts begin to sag somewhat, the abdomen becomes more creased, the elasticity of body tissue is reduced considerably, and the overall contour of the body begins to change. The following changes can be observed upon gynecologic examination: the uterus and ovaries have become noticeably smaller, fatty tissues around the vulva have been displaced, and the vaginal walls have become thinner and less elastic.

The onset of menopause is gradual in the middle years. Generally, menopause is completed sometime between the ages of 45 and 55. As menopause proceeds, the ovarian production of the hormones estrogen and progesterone will decrease. There is a simultaneous reduction in the synthesis of protein and fatty acids in the genital tissues. Even with these physiologic changes, no resultant decrease in libido has been demonstrated

Within five years after the menopause, the ovaries will have reduced their production of hormones to the level where lack of estrogen will begin to manifest changes in sexual physiology. The rate and amount of lubrication in the vaginal lining diminishes significantly. The vagina and labia majora shrink in both length and width, leading to a narrower vaginal opening, and the vaginal walls become thinner. These changes are responsible for the mechanical irritation that often accompanies sexual intercourse in older women.

Nevertheless, the differences of older women as sex partners are minimal. Women well into their eighth and ninth decades are capable of responding if appropriately stimulated. The capacity for clitoral stimulation and orgasm does not change.

The older male experiences a decrease in the production of the sex hormone testosterone until about the age of 60, at which time production is likely to level off and remain constant.

Typical normal changes in the aging male include a decreased rate in the production of sperm, more flaccid testes, (generally) an enlarged prostate gland, and overall loss of firmness in musculature. Involuntary morning or nocturnal erections occur less frequently in the older male.

With advancing age, men find that it takes longer to achieve a full erection. However, erection can usually be maintained for a greater period of time before orgasm.

Thus, the sex-specific changes in older men and women actually serve to encourage sexual activity with age. Since older women require a greater period of time to respond to stimulation during sexual activity, the male's need for additional time to achieve full erection is a com-

pensation or offset. Both these changes work together to help assure adequate sexual performance in the later years. What we have described as physiologic declines in sexual functioning could be viewed as appropriate and necessary changes to help guarantee sexual performance with age.

Section 2. Prevention and Health Maintenance

PREVENTION

Prevention is aimed at avoiding the development of illness or limiting its consequences. It is thought of as having three levels:

-- Primary prevention seeks to prevent the development of disease, as by immunization against contagious disease or by elimination of cancer-causing agents from the personal environment.

-- Secondary prevention relies on early detection of disease and attempts to limit disability. Early treatment of an acute disease to prevent it from becoming a life-threatening problem is a component of secondary prevention.

--Tertiary prevention deals with rehabilitation of a disabled patient to an optimal level of functioning and with prevention of further physical and psychological disability.

Health maintenance combines all of these types of prevention into a continuous program individualized for each patient. It incorporates elements of appropriate treatment. It promotes a regimen that seeks the highest attainable level of physical and social functioning for the individual for as long as possible.

Before proceeding to a discussion of specifics, it should be pointed out that disease in the elderly may have its origins earlier in life. Some preventive measures we mention should be taken well before age 65.

Primary Prevention

Many of the diseases we would like to prevent, like osteoarthritis, are still too poorly understood for specific intervention. However, we are gaining knowledge gradually about some major causes of death, such as heart disease and cancer. Epidemiological evidence provides the grounds

for some preventive recommendations in terms of lifestyle and exposure to noxious agents. Good health habits -- which include not smoking, eating three meals a day without snacking between meals, getting regular sleep of about seven hours a night, drinking alcohol only in moderation, getting regular exercise, and avoiding obesity -- have been found associated with better health and longer life. Seeing a physician regularly may reinforce good health habits.

Many aspects of primary prevention are in the social and political sphere, i.e., public health, whether this be immunization policy and practice, the development of standards for the quality of air, food and water, or regulating the occupational environment. Contagious disease, a significant threat, may be reduced through immunization as well as by avoidance of sources of contagion. Influenza carries off many of the elderly; an increase in geriatric deaths from pulmonary disease may indicate a gathering epidemic. The highest death rates during an influenza epidemic occur in persons over 65. Immunization against influenza virus is very much worth the risk of side effects for the geriatric population.

Many elderly persons, growing up in the days before childhood immunizations became routine, have never been vaccinated against tetanus. The incidence of tetanus in persons over 60 is more than four times higher than that of the rest of the population. For this reason, vaccination status should be ascertained in the elderly, particularly in the case of an injury. For those who have received primary immunizations, booster doses of tetanus toxoid should be given every five to ten years.

Tuberculosis has in the past few decades become largely a disease of older persons, not because it has become more frequent among them, but because it has declined so much more in younger people. Most persons who

develop tuberculosis today were infected with the organism years before, perhaps in childhood, and the bacteria subsequently remained dormant in their tissues until activated. Food-borne ilnesses are a group of diseases preventable by sanitary measures. Improperly cooked foods and those not adequately refrigerated may cause distressing gastrointestinal illness. Another mode of disease spread, not often considered in the aged, is venereal. The primary chancre of syphilis has been reported in men in their eighties. Elderly men may frequent prostitutes. The principle to be remembered is that the elderly are subject, to a greater or lesser degree, to the same risks as other groups.

We have been discussing primary protection from acute infectious disease, but the important causes of mortality in our society, especially for the elderly, are chronic diseases. Many of these diseases probably are initiated early in life. In older people it is particularly important to detect disease early and forestall additional damage through continous management, i.e., secondary prevention.

Older people may be at greatest risk of illness from certain environmental hazards because of long periods of exposure. For cancer-producing agents, which may be widely distributed in the environment, the time between onset of exposure and appearance of cancer may be 20 years. Whether the latency is greater or lesser in the aged than in the young has not been determined. Removal of known carcinogens, such as asbestos, from the environment is important regardless of age. Prolonged exposure to sunlight (actinic rays and ultraviolet), a common cause of skin cancer in the elderly, is prevented by protecting the individual. Smoking -- related to cancer of the lung, mouth, throat and esophagus -- is a readily identified and preventable cause. After ceasing to smoke,

a person's risk of lung cancer declines until, in 10 years, it is close to that of those who have never smoked.

Secondary Prevention

Early diagnosis and prompt treatment not only can prevent the spread of communicable disease and cure or arrest it but also can prevent later complications, possibly lessening disability.

Case-finding, a mainstay of secondary prevention, is recognized as important also for chronic diseases such as cancer. The major elements of case-finding are screening and the detection of specific illness in individuals. These are sometimes confused. Screening is a public health measure applied to populations, while detection in individuals is accomplished by the physician for his patient, who comes forward for care. (Detection will be dealt with more fully in later remarks on health maintenance.)

The basic concept in screening is the use of a testing procedure to separate individuals with no known complaints referable to the disease in question into groups with high and low probabilities of actually having the disease. Screening must be followed with definitive diagnosis by a physician to confirm the presence of the disease in a high-probability individual. Screening itself does not produce a diagnosis. There are a few diseases for which sensitive, effective, inexpensive and acceptable tests are available. Among these are hypertension, cervical cancer, and bowel cancer. On the other hand, screening for glaucoma has produced limited yield due to too many false positives. Screening for diabetes is feasible only accompanied by careful follow-up. Occasional testing of urine samples and blood sugars are often misleading.

In view of all the contradictory evidence regarding the value of

screening tests used on a mass basis, attempts at detection are perhaps best limited (1) to population groups in which the probability is reasonably high and (2) to those few tests and diseases which fit the criteria described. For example, radiographic screening for tuberculosis in the United States is no longer considered desirable because active cases are relatively rare. But the tuberculin skin test for exposure, not active disease, can be quite successful in mass screening, with x-ray as a follow-up.

Although screening may not be particularly useful when applied routinely to a geriatric population, examination of any group of people for the first time is bound to turn up abnormalities of which the individual may be unaware. For a population without a regular health-maintenance program, a complete screening examination should be done at intervals starting in the 40s. Various programs of periodic complete examination have been recommended, but there is little systematic evidence of their value on an annual basis until the 60s. When the patient seeks medical advice, however, the situation is entirely different. All the studies and tests necessary to diagnosis and treatment of the patient's ailment should then be performed.

Tertiary Prevention

The term tertiary prevention is commonly associated with rehabilitation or the prevention of complete disability after anatomic and physiological changes are more or less stabilized. It signifies an attempt to assist the patient, already damaged by disease, to make the most of the function that is left as well as to recover and improve function, where possible.

HEALTH MAINTENANCE

For any patient with chronic illness and especially for the patient with multiple problems, a team approach to care is desirable. Since the elderly are likely to have difficulties with living arrangements as well as several concomitant health problems, it is often useful for doctors, nurses, and social workers, at a minimum, to be involved in their care. The emphasis is on achievement of optimal functioning, maintenance of good health, and independent living.

The Comprehensive Examination

Entrance into health maintenance often is precipitated by an acute episode, or it may be that a routine examination reveals conditions that require a health-maintenance strategy. Whatever the beginning, the first step is a comprehensive examination. This should include a complete history of the present illness and recent deviations from normal health, and a careful physical examination including rectal exam and, in women, a pelvic examination.

Family history and patterns of coping with physical, mental and social stress are important to know for purposes of family-centered care and making the most of the patient's strengths. An occupational history may shed light on exposure to hazards in the environment. Information on the patient's diet, exercise and drug-taking may be useful, if not critical to diagnosis and treatment.

With the basic background at hand, the physician and patient can review the evidence of illness, the symptoms, and the problems of concern to the patient. A problem list should emerge from this examination, indicating priorities for follow-up. This is the essence of secondary prevention.

Standard Tests

Routine measurement of height, weight, temperature, blood pressure, and pulse rate should be recorded at the first visit and at regular intervals on later visits. Some tests should be obtained as a baseline to compare against future changes, for example an electrocardiogram at age 50 or thereabouts, if it has not been done before, and a chest x-ray for heart size and configuration and possible lung lesions.

A complete blood test and urinalysis should be done at the first examination. In men it is desirable to do a serum uric acid, serum cholesterol, post-prandial blood sugar, serological test for syphilis, tuberculin test and stool for blood. In women, the uric acid may be omitted, and cholesterol put off until after the menopause. A Papanicolau smear for cervical cancer should be routine. Women should be taught breast self-examination.

Periodic Examinations

In general, the patient should be examined about every two years from age 55 on. Some additional tests and procedures are indicated as the patient gets older. After 65, annual influenza immunization is desirable. For women, self examination of the breast should be stressed at all ages from puberty on. Mammography should be restricted to women over 50 who have a history of breast cancer.

Health-maintenance examinations are individualized for the patient. Since most people by age 65 have some chronic illness or habits of hygiene that could be improved, regular visits to the physician may be necessary, at least once a year. These may be supplemented by interim visits to a nurse practitioner.

In the management of long-term illness, such as cardiac failure, the nurse practitioner may see the patient and family once a month or more often, making reports to the physician, who may find it necessary to examine the patient himself only once in three or four months.

As vision begins to change in middle age, it is usually desirable to have an ophthalmologist check the patient's eyes. An optometrist may be substituted to do a screening exam and check refraction. An ophthalmologist should examine the older patient every two or three years, even though the primary physician checks the eyes at his periodic examination.

Women, after menopause, should have a regular examination by a gynecologist, perhaps every two years. Major risks for women beginning in the 50s, even greater than carcinoma of the cervix, are malignancy of the ovary and uterus.

Disease of the gums is extremely common in the elderly, the more so if they have smoked heavily for many years. It can be prevented or long-delayed by proper prophylaxis. The elderly patient should be encouraged to see a dentist at least once a year, and the hygienist should carry out a prophylaxis at least every six months. Loss of dentition interferes markedly with good nutrition, as well as being a source of social and physical discomfort.

Consultation

Thorough-going health maintenance may require consultations. Because loss of hearing is a major geriatric disability, the routine examination should evaluate hearing, with referral, if necessary, to an ear-nose-throat (ENT) specialist for an audiogram and evaluation for a hearing aid. Foot problems that hamper mobility may need the care of a podiatrist, and probably regular attention when the patient

has diabetes or poor peripheral circulation.

A human service provider's consultation may be useful for the patient with health-related difficulties involving housing, transportation, family dissension, or recreation. The practitioner can help the older patient keep in contact with others (staving off depression) and to make contact with community agencies for needed services. A psychiatrist should be available for evaluating depression and early senility.

Nutrition and Exercise

Nutrition and physical activity are important to maintaining health. This is not the place to detail adequate diets and exercise regimens. However, an effort to counsel the elderly should be made in a comprehensive health-maintenance program. It may be illuminating to both patient and practitioner to document actual food intake over a two- or three-day period. This is often helpful in analyzing causes of obesity or weight loss. Patients may need advice on maintaining protein intake, reducing fat calories, moderating use of coffee and tea, incorporating fiber in the diet, and in avoiding refined sugar. Anemia or any other factor in weight loss should be investigated thoroughly. (Iron supplements should not be taken routinely, since this may mask anemia due to internal bleeding.)

Maintaining weight is easier if adequate exercise is carried out. Exercise in itself improves the circulation and mobility. Walking is the best form of exercise. Exercise should be sufficient to speed the heart rate and continued long enough to leave the patient feeling relaxed afterwards.

Rehabilitation

When a patient suffers a major disability due to a fracture, heart attack, stroke, or other illness the help of a team of practitioners often is essential to attempts to restore the patient to independent living. The services of specialists in rehabilitation medicine, occupational and physical therapists, and others may be required.

After the acute episode, much of the treatment may be carried out in the home if family or friends are willing to undertake it. Home-health agencies may coordinate care in the home. The day hospital or health-oriented day care center is also an alternative to hospitalization during rehabilitation. Some patients may require long-term care in the home, the day hospital, skilled nursing home, or hospital. Absence of friends, relatives and resources often necessitates prolonged institutionalization. By careful planning, the human service provider may be able to prevent this development. Many residents of nursing homes, even mental institutions, are there because no alternative services are available to them.

Section 3. Some Diseases Common to the Elderly

INTRODUCTION

In the first section of this chapter, we discussed the gradual decline in function of most or all bodily organ systems which occurs with aging. However, these changes in themselves are not sufficient to produce significant disability. The principal and clinically manifest limitation produced by this decline is in the ability to respond to stressful events, whether these be physical (such as the onset of disease or accidents) or mental or emotional stress. There is less reserve function to meet unusually high demands. However, the "frailty" of older people should not be exaggerated. They have gained a lifetime of experience in dealing with stresses. Indeed, in their later years they are constantly coping with major stresses, especially losses: for some, retirement creates a psychological loss; many encounter loss of spouse and friends, loss of income, loss of function due to chronic diseases.

Chronic diseases are the hallmark of old age. Almost all older people will have acquired several chronic diseases. Once present, chronic diseases persist for the rest of life. However, chronic illnesses that could result from these can be often controlled, enabling an individual to function normally. Some 80% or more of the population will have one or more chronic diseases or disabilities by age 65. Some 30% to 40% will have significant impairment in eyesight or hearing. At least an equal number will have some degree of arthritis. Some 25% to 30% will have some signs and symptoms of atherosclerotic cardiovascular disease and almost as many will have some evidence of "dementia" or depression. More than 15% will have diabetes mellitus. With survival into the 70's, 80's and 90's, most people will have several chronic diseases. Thus, practitioners working with the health problems of older people must recognize

and be able to deal with a number of interacting chronic diseases and disabilities.

The overall goals in dealing with diseases in the elderly are to prevent the onset or advancement of diseases, to restore function to the maximum extent possible, and to maintain the residual function where restoration is not possible. Even small accomplishments in restoration of function or prevention of further disability may make big differences in the older person's life.

SPECIFIC DISEASES AND DISABILITIES

In considering specific diseases and disabilities of older people, two approaches have been selected. These are: (1) to look at the major or common presenting symptoms which then lead to identifying different causes and (2) to start with and discuss common disease entities. A few examples of major diseases follow, largely to acquaint the nonmedical practitioner with medical approaches and perspectives.

Falls

A fall is the most common symptom or event leading to major concern, and often to hospitalization. In a recent review of causes of admission to a geriatric service of an acute general hospital (where all new patients over the age of 75 were admitted), over half were the result of a fall or its consequences. A fall is frequently the first symptom of a major disease condition. Exton-Smith has documented the common causes of simple falls among women as follows:

Causes of falls (Females)

Cause	Age	
	65-74 (n=77)	75 and over (n=113)
Giddiness	6%	16%
Loss of balance	10	9
Drop attacks	14	12
Tripping	37	22

(Source: Exton-Smith, A. N. and Evans, J. G. (Eds.). Care of the Elderly: Meeting the Challenge of Dependency. New York: Academic Press, 1977)

In this study, tripping is less common in persons over age 75 than in those between the ages of 65 and 74. The difference may be due to the fact that those over age 75 are less physically active and thus run less risk of falling, or that those who have survived to that age are generally stronger. With the declining eyesight that is common in older people, tripping over irregular flooring or carpeting or over some object is a hazard.

"Drop attacks" or sudden fainting might be due to orthostatic hypotension, a fall in blood pressure on first standing up (which may be a manifestation of other diseases like the autonomic neuropathy of diabetes mellitus, or anemia, or adrenal cortical hormone deficiency), a sudden onset of an irregularity in heart rate causing inadequate delivery of blood to the brain, or a metabolic disturbance such as hypoglycemia or low blood glucose as in a diabetic person taking insulin or an oral antidiabetic drug. Nevertheless, the cause of "drop attacks" is often not immediately apparent and requires intensive investigation.

"Giddiness" describes a lessened ability to maintain the upright posture. Exton-Smith and colleagues have shown that there is increased body sway with age, and more sway in those persons subject to falls from giddiness or "drop attacks" than in others. An increased unsteadiness leading to a fall may occur as the first expression of a febrile illness, presumably due to further impairment in oxygen supply to the brain. Giddiness may also be a manifestation of more severe diseases such as vascular disease of the brain, including vertebrobasilar artery insufficiency, or low-pressure hydrocephalus.

Another major cause of falls is stroke. Often the first awareness that a stroke is developing comes when an older person starts to get up and falls due to weakness on one side. The weakness may be minimal and may even be missed unless a careful examination of the causes of falls is undertaken.

Dementia

Evidence suggesting impaired mental functioning is another of the most common symptoms to appear in older people. Most people think of "senility" as inevitable and untreatable, and attribute to it almost any type of mental or emotional change in elderly people. The fact is that many treatable conditions not only are often present in older persons considered demented or senile but also may be the causes or intensifiers of "senility." For example, a febrile infection may precipitate an episode of confusion. The importance of careful diagnosis and search for such treatable causes cannot be emphasized enough.

Depression is common in older people, affecting as many as 10% to 30%, and is often mistaken for dementia, especially if practitioners and family believe it is "natural" in old age. This can be a problem in

diagnosis when the depression is present in addition to other neurological disease. An example is a man in his 70's, who is partly recovered from a previous stroke, who is now described by his wife as becoming increasingly "demented" because he is not doing anything in his own care, and is giving little response to those around him. Examination reveals that his mental function is intact. He is fully oriented, has accurate memory for recent and remote events, and can carry out ordinary mental exercises. He is, however, profoundly depressed. Depression in older people often responds well to drugs, to electroconvulsive therapy, or sometimes to relieving situational pressures (such as loss of income or change of residence). Thus, its possible role in any older person with mental or emotional symptoms needs to be carefully assessed. Schizophrenic or paranoid states in elderly people are another type of mental illness which may respond to drug therapy.

A third cause ofwhat may at first glance appear to be dementia is sensory deprivation, the lack of stimulating input due to physical or social isolation. This can occur anywhere, whether or not others are present, depending upon the frequency and nature of actual contact made with the older person. Deficits in hearing and seeing add to the likelihood of sensory deprivation.

The true symptoms of dementia--which are loss of orientation, forgetfulness and memory loss, and inability to carry out cognitive functions--may be the result of general diseases affecting the whole body. One of the most common circumstances is the onset of a febrile illness, as noted above. Others include anemias, cardiac or pulmonary failure, renal insufficiency with uremia, dehydration, fecal impaction, urinary retention, and metabolic or endocrine disturbances such as diabetes mellitus,

hypothyroidism, hyperthyroidism, folic acid deficiency, deficiency of vitamin B-12 and at times other vitamins, and potassium deficiency. Proper treatment of any of these conditions often results in dramatic amelioration of the signs of dementia.

Another common cause of symptoms of dementia is overmedication with various psychotropic, sedative or tranquilizing drugs. An essential first step in evaluating anyone with mental abnormalities is to obtain an accurate account of prescribed and over-the-counter drugs being taken. Emotional stresses of any type--particularly new stresses, such as admission to hospital for any cause, or change in residence, or death of spouse--may precipitate signs of dementia.

There are, in addition, certain specific diseases of the central nervous system that may give the picture of dementia. These include certain brain tumors and transient ischemic attacks and strokes affecting certain parts of the brain. Usually there will be evidence of other localized neurological damage.

The final group of elderly persons with dementia are those in whom none of the above identifiable, and usually treatable, causes can be found. This condition might most accurately be termed idiopathic dementia of the elderly, inasmuch as there is at present only limited information about its nature and possible causes. In many instances it appears to have much in common with the condition called Alzheimer's pre-senile dementia, i.e., dementia developing at earlier ages. This disorder has associated with it radiological and pathological evidence of decreased brain mass and neurofibrillary tangles and plaques. These changes, also found in elderly persons with idiopathic dementia, lead to the speculation that there is a specific pathological process involved, whether the dementia is pre-senile or senile. There has been speculation about a specific, identifiable

cause, such as the possibility that the brain damage and dementia are a late result of a viral infection, or the result of some environmental toxic substance. The additional possibility of genetic predisposition is also under investigation.

The most important aspect of these findings and speculations is that they give encouragement to the view that idiopathic dementia of elderly people is, like other disabilities, due to one or more specific disease processes which may ultimately be understood and treated. At the very least, there is no evidence that age by itself leads inevitably to dementia.

Cardiovascular Diseases

Of specific diseases affecting elderly people, cardiovascular disease is one of the most common. It is the most frequent cause of death. At least 40% of all individuals over the age of 65 years will die of cardiac disease, 15% of cerebrovascular disease, and possibly another 5% secondary to other types of vascular impairment. Some degree of atherosclerosis is present in everyone by later life. Among elderly people, 30% or more have symptoms related to cardiovascular disease; in addition 20% to 25% of those without present or prior symptoms have electrocardiographic evidence of a previous myocardial infarction.

Certain aspects of cardiovascular disease have particular relevance to elderly people. These are cardiac arrhythmias, hypertension, congestive heart failure and peripheral vascular disease.

Cardiac arrhythmias and defects in conduction have already been referred to as a cause of "drop attacks." They include rapid, irregular heartbeat and nerve conduction irregularities. These abnormalities may occur suddenly and be transient. During such an episode the person may

have symptoms of palpitations, impending or actual fainting, and symptoms of heart failure.

Most such abnormalities in rhythm are due to atherosclerosis of the coronary arteries with resultant damage to the heart muscle, although they can be due to an acute myocardial infarction, or occur as a result of some other form of heart disease, such as rheumatic valvular disease. Another type of arrhythmia is that of sinus slowing or sinus arrest secondary to an unusually sensitive carotid sinus, a nerve structure responsible for reflexes that affect heart rate.

Many arrhythmias and conduction defects can now be treated through the implantation of a cardiac pacemaker. In other situations drug therapy (with digitalis preparations and/or quinidine, procaine amide, and propanolol) will control the arrhythmia. There is usually a good outlook with proper treatment.

Hypertension and hypertensive cardiovascular disease is related to elevated blood pressure. Systolic blood pressure (the pressure during heart contraction) tends to rise with age; the rise is associated with less elasticity of the larger arteries. Most specialists have minimized the importance of these systolic rises as long as the diastolic (between-the-beat) pressure is not elevated, e.g., not over 90 to 100 mm/Hg. However, epidemiologic studies have shown an apparent contribution of elevated systolic blood pressure alone to mortality from coronary artery disease. Whether lowering the systolic blood pressure in such persons would result in less risk is not proven.

The most important emphasis is on early detection and adequate treatment of unequivocally elevated diastolic blood pressure. At the same time, treatment should be cautious, with avoidance of producing

hypotension, dehydration, or electrolyte imbalance. Just as inadequate treatment carries the risk of cerebral hemorrhage, overzealous treatment can lead to impaired brain profusion and strokes.

Unless diagnostic evidence for one of the rarer causes of hypertension is found (such as renovascular hypertension, primary hyperaldosteronism, or pheochromocytoma), initial treatment will usually consist of a diuretic drug regimen, with supplemental potassium if necessary. The addition of vasodilating and/or neuro-transmitter-blocking drugs may follow, if initial treatment with a diuretic drug regimen is not effective.

Congestive heart failure (inefficient pumping) is most commonly a result of the death of heart tissue (myocardial infarction) and rarely may be due to other causes. An older person with atherosclerotic coronary circulation may go into acute congestive failure from almost any type of stress, such as an acute febrile illness, unusual exertion, hyperthyroidism, or social and emotional pressures. The signs and symptoms of congestive failure may be minimal. These include ankle swelling, shortness of breath (dyspnea) on exertion, orthopnea and/or paroxysmal nocturnal dyspnea. In most cases, the currently available drugs for treatment of congestive heart failure successfully keep the older person symptom-free for long periods of time.

Peripheral vascular disease may be both slowly advancing and may cause sudden occlusions of major peripheral vessels. The presence of hypertension, diabetes mellitus, or hyperlipidemic states increases the likelihood of peripheral vascular disease. Surgical approaches, including the reopening of a suddenly blocked, or occluded, vessel or the introduction

of by-pass vessels for chronically occluded areas, have been successful in preventing permanent damage, and in restoring functional capacity. Vasodilating drugs are rarely helpful.

Arthritis

Degenerative joint disease develops in almost everyone, through the accumulated effect of wear and tear on joints. Genetic and developmental factors may predispose to degenerative joint disease. This is most clearly seen when congenital deformities of the musculoskeletal system lead to increased and abnormal wear on certain joints. In general, however, the location and amount of degenerative joint disease is related to the cumulative use of, and weight applied to, any given joints throughout a lifetime. Thus, knees, hips and spine are particularly likely to be affected. Excessive use, as in heavy labor or obesity, adds to the degree of damage.

The symptoms of degenerative joint disease may vary from simple stiffness, to pain on use of the joints, to increasing loss of mobility. The knees and spine are most commonly affected, but symptoms may also develop in hips, ankles, fingers, elbows, and shoulders. In contrast to other inflammatory arthritis (such as rheumatoid arthritis), the person with degenerative joint disease will not have any systemic symptoms. X-ray films will show degenerative joint changes.

In most persons, simple treatment results in relief of symptoms. This includes: temporary rest or less use of the joints (by using a cane, for example) while maintaining as full a range of motion as possible; basic anti-inflammatory drugs (aspirin or acetaminophen); simple exercises to strengthen muscles as an adjunct to drug therapy; and weight reduction. A sustained treatment program is important. Symptoms may recur, usually after excessive use of a joint, but the person can expect to continue all

normal activities, unless damage is severe. If hips or knees are severely damaged, and if pain and limitation of motion exists, orthopedic surgical intervention with joint replacement offers relief of symptoms and restoration of function.

Rheumatoid arthritis affects many older people. Perhaps as many as 15% of older women have the deformities and loss of function produced by rheumatoid arthritis that had been active earlier in life. This earlier activity sets the stage of acceleration of degeneration in later life. In addition, acute rheumatoid arthritis occurs occasionally in older people in their 70's and 80's with typical symptoms of tender, hot, swollen, stiff joints. The hands and wrists are most commonly affected, although symptoms (and residual deformities) also can occur in ankles, elbows, shoulders, knees, and hips. In the acute or active phase, there will be general or systemic symptoms: fever, loss of appetite, loss of weight, and weakness.

The treatment of acute rheumatoid arthritis includes physical measures (heat, hydrotherapy, physical therapy), anti-inflammatory drugs, and attention to overall rest, good nutrition, and minimizing the stress from any social and emotional problems. Usually, the inflammatory process of rheumatoid arthritis can be controlled and permanent deformities prevented. When deformities and related loss of muscular strength are present, at least partial compensatory restoration of function can often be achieved through development of strength in auxiliary muscles and the use of supporting braces and other mechanical devices to supplement joint function.

Polymyalgia rheumatica is a disease occurring almost exclusively in older people, the main symptoms being aching and stiffness in the shoulder

and hip girdles on both sides. The aching is constant, not related to joint movement, and extends to the muscles in these areas. Evidence of an inflammatory process (in the form of elevated blood sedimentation rate) is almost always present. Commonly associated with polymyalgia rheumatica is temporal arteritis, an inflammatory change in one or both temporal vessels of the head. A serious potential complication, risking loss of vision, is arteritis in the ophthalmic artery. Recognition of this syndrome, whose cause is not known, is important because the consequences can be serious and because the signs and symptoms can be relieved dramatically with small doses of the drug prednisone.

Diabetes Mellitus

Diabetes mellitus has become recognized as increasingly common among older people. It is present in one-sixth of those over age 65, and in one-fourth of those over age 85.

Diagnosing diabetes mellitus in older people is difficult because there is an overall decline with age in the ability to metabolize a test dose of glucose. After a standard test dose, over half of the people aged 70 or more have an elevated plasma glucose value, compared to values established as "normal" in younger people. The cause of this declining glucose tolerance with age is not clear.

The National Commission on Diabetes has recommended a graded allowance for the changes seen with aging. Persons whose plasma glucoses fall in the questionable or possible range should have regular, repeated re-evaluation inasmuch as a number will eventually have definite evidence of diabetes.

In most instances, diabetes appearing in older people is associated with obesity. Often they have none of the typical symptoms of diabetes, such as frequency of urination and thirst. The first symptoms may be due

to the neuropathy that can be associated with diabetes, such as loss of sensation in the feet or hands, incomplete bladder emptying, impotence, or wasting of the small muscles of the hand. A rarer but much more serious initial picture occurs when a person not previously known to be diabetic insidiously develops very high blood sugar levels, and becomes severely dehydrated and comatose, without actually developing keto-acidosis.

The possibility of diabetes must be always kept in mind in any older person who is obese, who has a strong family history for diabetes, or who has evidence of vascular disease. Diet is the most important part of treatment of diabetes. In those who are overweight restriction of caloric intake and a suitable increase in daily exercise, sufficient to produce weight reduction, will almost always produce satisfactory diabetic control.

For those in whom diet and exercise alone do not achieve adequate diabetic control, controversy continues about the relative merits and risks of oral hypoglycemic agents or insulin. Although not conclusive, the evidence that the oral agents may cause increased incidence of cardiovascular death, in particular in persons who already have some cardiovascular disease, is sufficient to call for caution in the use of these agents in older diabetics.

Care of the feet is very important in older poeple with diabetes, with attention to cleanliness, avoidance of injury, and of extremes of heat and cold. Every older person with diabetes should have regular podiatric care.

Some complications of diabetes appear to be less common in persons whose diabetes begins in older years rather than in younger years, in particular the vascular disease of the kidneys and eyes. This may be because of the time which appears to be necessary for appearance of these

complications after the onset of diabetes. There is increasing evidence, in animal experimentation and also to a limited degree in studies of diabetics, to support the view that good control of diabetes will minimize or avoid the development of vascular complications.

CONCLUDING REMARKS

Disabilities in older people, whether in the form of symptoms or actual loss of function, should not be written off casually as aging. Rather, in all cases a careful search should be made for specific disease processes which are causing the disabling changes. In many instances these diseases can and should be treated, the objectives being restoration or maintenance of function so that the individual may be as self-reliant as possible.

Percent distribution of assessment of health status
as reported in health interviews
for persons 65 years and over,
according to selected demographic characteristics:
United States, 1975

(Data are based on household interviews of the civilian noninstitutionalized population)

Demographic characteristic	Health status				
	All health statuses [1]	Excellent	Good	Fair	Poor
	Percent distribution				
Total	100.0	28.6	40.3	21.5	8.6
Sex and age					
Male	100.0	28.1	40.0	21.4	9.4
65-74 years	100.0	28.5	39.8	21.5	9.3
75 years and over	100.0	27.5	40.3	21.3	9.8
Female	100.0	28.9	40.6	21.6	8.0
65-74 years	100.0	29.2	41.4	21.5	7.2
75 years and over	100.0	28.6	39.3	21.8	9.4
Color					
White	100.0	29.4	40.8	21.0	7.8
All other	100.0	20.6	35.5	26.7	16.3
Region					
Northeast	100.0	27.3	44.4	21.2	6.2
North Central	100.0	27.1	43.2	21.6	7.1
South	100.0	27.6	35.4	23.5	12.4
West	100.0	35.3	38.4	18.0	7.5
Residence					
Metropolitan	100.0	30.6	40.5	20.1	7.8
Nonmetropolitan	100.0	24.4	40.0	24.7	10.3
Family income [2]					
Less than $5,000	100.0	23.3	38.7	24.9	12.2
$5,000-$9,999	100.0	29.8	41.3	21.4	6.8
$10,000-$14,999	100.0	31.6	42.7	19.9	5.1
$15,000 or more	100.0	38.7	40.3	13.9	5.8

1 Includes unknown health status.
2 Excludes unknown family income.
SOURCE: Division of Health Interview Statistics, National Center for Health Statistics.

Death rates for the 10 leading causes of death

among persons 65 years and over,

by 1975 rank order for both sexes,

and by sex for 1975:

United States, 1950, 1965, and 1975

(Data are based on the National Vital Registration System)

Causes of death	1950	1965	1975		
			Both sexes	Male	Female
	Deaths per 100,000 resident population 65 years and over				
All causes	6,270.3	6,118.3	5,432.4	6,702.7	4,550.9
Diseases of heart	2,860.9	2,823.9	2,403.9	2,933.0	2,036.7
Malignant neoplasms	856.5	901.4	961.1	1,301.1	725.2
Cerebrovascular diseases	923.8	901.0	729.7	740.5	722.1
Influenza and pneumonia	191.3	213.7	187.1	239.2	150.9
Arteriosclerosis	---	---	123.0	119.8	125.2
Diabetes mellitus	121.1	122.9	112.9	102.8	119.9
Accidents	210.8	155.0	109.6	140.6	88.1
Motor vehicle accidents	43.1	38.9	25.3	38.7	16.0
All other accidents	167.7	116.1	84.3	101.9	72.1
Bronchitis, emphysema and asthma	---	---	80.5	152.5	30.5
Cirrhosis of liver	34.9	34.5	36.6	58.1	21.6
Nephritis & nephrosis	---	---	23.2	...	...
Suicide	30.0	22.8	...	36.8	...
Hernia & intestinal obstruction	37.6	35.6	...	...	20.5
All other causes	---	---	664.9	878.4	510.1

SOURCES: National Center for Health Statistics: Vital Statistics of the United States, Vol. II, for data years 1950 and 1965, Washington, U.S. Government Printing Office; and for 1975, Health Resources Administration, DHEW, Rockville, Md., to be published.

Section 4. Oral Health

INTRODUCTION

This section gives special attention to an aspect of aging and care of the elderly that often is slighted yet is crucial to their well-being--oral health. One has only to note that the Medicare program was inaugurated without coverage of preventive or routine corrective dental care to recognize how easily a crucial area of geriatric concern is being ignored. Although half of the 65 and older population have no natural teeth, all require diligent daily home care. Periodic professional visits are necessary for fitting and refitting prosthetic appliances (full and partial dentures) and for maintenance of remaining natural dentition and their supporting structures (gums and bone--the periodontium). Periodontal disease is widespread among the elderly, and the incidence of oral tumors rises considerably with age.

Oral disease, loss of teeth and poorly fitting false teeth bear immediately on one's systemic health and physical and emotional well-being. The older person with poor oral function chews with difficulty, may suffer nutritionally and may speak poorly enough to impede communication with others. Poor oral function could be both stressful in social situations and destructive to self-image.

The need for routine professional dental care and self maintenance is surely lifelong. The place of dental care in a comprehensive health-maintenance program already has been noted in Section 2. It remains to be said, however, that the elderly probably see physicians and almost any other practitioner far more than they see dentists (on an average, less than once a year). For this reason, in any encounter with an aged person, a practitioner should be alert for signs and symptoms of oral disease or disability and be prepared to refer the individual to the dentist.

EFFECTS OF AGING ON ORAL HEALTH

With age, several factors alter tissues in and around the oral cavity, including the lips, cheeks, tongue, salivary glands, bones, blood vessels and joints. Acuity of taste diminishes with age, prompting some individuals to over-salt food or to excessive use of sweets for a stronger taste sensation. Gradual nerve degeneration, decrease in number of taste buds, and thickening of the epithelium of the tongue are thought to be responsible for the loss in taste.

While the tongue surface is changing, so are the mucous membranes of the lips, buccal and palatal tissues (inside of cheek and roof of mouth), and floor of the mouth. The surface layer--epithelial membranes--become thin and easily injured. There are atrophic changes in the salivary glands and a reduction in salivary flow, resulting in dryness of the mouth.

In the aged, there are changes in physicochemical properties such as decreased ptyalin content and increased mucous making the saliva more viscous and ropy. These changes promote increased formation of plaque, a sticky tooth-clinging substance composed of bacteria, food and cellular debris, producing acids that attack teeth and the periodontal tissues. An oral environment is thereby created leading to caries and periodontal disease and, if untreated, to the loss of teeth.

A pronounced salivary deficiency may make the oral mucosa appear dry, atrophic, and inflamed. The patient may complain of a burning sensation, pain and dryness, cracking of the lips, and fissuring of the tongue. Chewing and swallowing become difficult, contributing to the loss of sense of taste.

Aging produces changes in the blood vessels. Varicose vessels are often seen on the underside of the tongue and the floor of the mouth. Atherosclerotic changes occur with the accumulation of lipids in the walls of medium-sized sub-lingual arteries. Studies suggest that these changes may be a result of the high intake of saturated fats, cholesterol and sucrose prominant in the inadequate nutrition of the elderly.

Problems in chewing are also caused by pain and limitation of movement in the hinge (temperomandibular joint) of the jaws. Temperomandibular joint difficulties may be a result of excessively worn down teeth (over closure of the jaws), a long-standing malocclusion (bad bite), arthritic changes or traumatic injuries to the head and neck. Any and all of these causes can be related to natural, false or partially restored dentition. Treatment consists of restoring good occlusion to the chewing apparatus allowing injured and stretched ligaments to return to normal function. Recent studies have shown that there is a relationship between a distorted spinal column and temperomandibular joint pain and dysfunction, successfully treated by cranialosteopathic manipulation.

The alveolar bone, the bone around the teeth, undergoes constant change and remodeling in response to injury, periodontal disease and the force of chewing. In the aged person there tends to be an increase in bone disease (perodontitis) of the jaws, and resorption of existing bone occurs faster than the deposition of new bone. Should teeth be lost, the alveolar bone no longer serves its primary function of tooth support and it is resorbed. If all or most teeth are removed, the ridges formed with the resorption of the alveolar bone may be flattened totally, making it most difficult to wear and function with dentures. The loss in vertical height of bone and the change of the angle of the mandible is seen as loss of

face height in older people. Advancing knowledge and techniques in dentistry, reasonable lifetime care, and funds allocated eventually in the Medicare program should eliminate the myth that most elderly people will have to wear false teeth.

INTERACTION OF ORAL AND GENERAL HEALTH CONDITIONS

Impaired conditions of the mouth and teeth may have repercussions involving the entire body and, conversely, all systemic and chronically-debilitating diseases affect the tissues of the oral cavity. Although this is particularly apparent in the elderly, before the advent of antibiotics therapy, oral foci of infections were responsible for death of the young as well as the aged. General infections of the gums, teeth, and periodontium acting as a source or focus of infection may bring about pericarditis, endocarditis, kidney infections, and infections of the brain. Studies have shown that probably 80% of all lung abscesses are caused by faulty dentition.

Because bacterial flora is more extensive in the oral cavity than in all other body orifices, the mouth is an ideal source of infection. Death or necrosis of the pulp of a tooth from trauma or deep decay results in a dental abscess in the alveolar bone at the root apex. Additionally, periodontal disease involves a pocket or space around the roots of teeth. These pockets, sometimes formed deep within the gums, are in direct contact with oral bacteria as well as in intimate contact with blood and lymph vessels. Therefore, potential pathogens have access to distant areas of the body, via the blood and lymph systems, by direct extension through the tissue, and by direct movement into the gastrointestinal and pulmonary tracts by swallowing and aspiration of infective material.

Studies have shown that in patients with septic mouths, the mere rocking of a tooth was sufficient to cause bacterial infection of the blood (bacteremia) in 86% of the cases. The act of chewing -- bringing pressure to bear on upper and lower teeth -- creates a pumping action on periodontally involved teeth and gums forcing bacteria into the blood and lymph streams, into subjacent tissues, and out of the pockets to be swallowed with the saliva and bolus of food.

With periodontal disease so prevalent in the aged, it is imperative that those with faulty heart valves (murmurs), a history of myocardial infarction, diabetes or kidney impairment be protected from possible bacteremia by the prophylactic use of antibiotics before undergoing any dental procedures. All systemic and chronically debilitating diseases affect the tissues of the oral cavity. People with diabetes often have infected gums that bleed easily. However, a similar symptom can result from leukemia, endocrine malfunctions or generally poor oral health. A careful investigation must be undertaken to find the source of this symptom so that the treatment can be designed to alleviate and/or control the causal condition.

Allergies of the upper respiratory tract often cause obstructions of the nasal cavities which result in constant mouth-breathing. This leads to dehydration of the oral membranes, which may increase the risk of infections, periodontal disease, and caries and create further difficulties for the aged in the wearing of dentures.

DISEASE PREVENTION AND HEALTH MAINTENANCE

Prevention is best accomplished by regular check-ups, restoring decayed teeth to normal form and function, periodontal treatment, and

the replacement of missing teeth. The importance of teaching the elderly the proper techniques of home care, as well as the need for regular visits to the dentist, cannot be underestimated.

As a rule, the caries rate decreases with advancing age, but periodontal problems increase. Caries and plaque accumulation go hand in hand. Plaque must be meticulously removed from the teeth with dental floss and a toothbrush at least once a day, preferably at night before retiring to bed.

Dental plaque and calculus control is of greatest importance in oral health. There is universal agreement on the fact that freedom from microbial dental plaque is synonymous with gingival and oral health. Daily mechanical and chemical reduction of the microflora of the margins of the gingiva, even over a few days, will have amazing anti-inflammatory effects on the periodontium. In addition to regular visits to the dentist, prevention of caries is aided by the regular use of fluorinated toothpastes, fluoride rinses and topical fluoride treatments.

The edentulous mouth must also be cleaned. The oral tissues, palate, gums and tongue should be brushed. Partial or full dentures should be brushed and cleaned. If tartar and stains adhere to the removable bridge or dentures, the cheapest and best home remedy is to (1) soak them in concentrated vinegar and (2) to brush and rinse them thoroughly afterwards. The best way to retain oral health is by maintaining one's own dentition. If teeth are lost, they should be replaced as soon as possible.

Many elderly people will require full dentures. It is physically and psychologically traumatic for a person to be faced with wearing full

dentures. Persons with new dentures need care and coaching in proper usage and care of their new teeth, and in the cleaning and care of oral tissues. In addition, many people with new dentures need teaching in speech and phonetics, since many speech sounds are difficult to produce with dentures.

NUTRITION AND ORAL HEALTH

The foods recommended for good oral health are generally the same as for good general health, such as milk (skimmed), meat (lean), poultry, fish; dried peas, beans, nuts; whole grain cereals; margarine; vegetables and fruits (including juices). Refined sugars should be no part of the diet and natural sugars, such as contained in fruit, no more than 10% of the daily caloric intake.

Dietary intake of toxic elements and disease-producing chemicals should be avoided. Moderation in use of alcoholic beverages and total abstaining from smoking are good health practices. The risk of contracting cancer of the lips and mouth is definitely increased by heavy smoking, overindulgence in alcohol, hot foods, possibly chronic exposure to certain chemicals and exposure to the sun. The fact is that 60% of the population does not seek dental examination on a regular basis, thus preventing early diagnosis. Recent studies show that the incidence of cancer is increasing, including cancer of the throat, lips and oral cavity. Some 85% of cancer of the mouth consists of squamous cell carcinomas, about half occurring on the tongue. The remaining 50% are divided about equally among the palate, floor of mouth, the gums, and the buccal mucosa. The five-year cure rate of these cancers is poor. Cure rates for cancer of the lips are extremely favorable. Studies have

shown that a three-year cure rate runs as high as 90%, and a five-year cure rate as high as 85%.

CONCLUSION

Successful motivation for efficient oral hygiene habits is based on harmonizing three parties interested in maximum oral health -- the patient, the dentist, and health insurance. Each party must recognize and continually stress that oral health care for the elderly depends on an active preventive maintenance program. All efforts should be directed toward preventive care, primarily, and routine corrective care, secondarily.

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Chapter III: Psychologic Aspects of Aging

INTRODUCTION

Psychologic aging, like biologic and social aging, is associated with chronologic age, but is not identical with it.

Psychologic age is indicated by the individual's capacity for adaptive behavior to the demands of the environment. Subjective reactions to life events, as well as the integrity of the biologic system, influence one's psychologic age. One feels young or old in response to life events. These, in turn, influence the extent to which adaptive capacities such as learning, memory and problem solving are used. Changes in personality and intelligence are also included in these considerations.

Biologic, psychologic and social age are to some extent interrelated, but there is no simple and direct relationship among them. Moreover, the relationship changes with different generations.

The study of psychologic development examines personal behavioral changes across the life cycle. In order to describe and understand developmental changes in people over a period of time, we want to know about both intra- and inter-individual differences. A life-span developmental approach seeks explanations for developmental changes and differences. Current approaches view the individual as a changing organism in a changing environment. Thus, both biologic and environmental factors affect the nature of individual development.

Contrary to commonly held ideas, people do not change in standardized ways over the life cycle. Rather, a lifetime of experiences serves to increase individual differences and results in diverse life styles. Thus the older population is more heterogeneous than the younger population.

A review of psychologic aspects of aging requires that we identify and distinguish among those characteristics that represent "normal" aging,

those that are secondary to the older adult's state of health, and those attributable to social and environmental circumstances.

COGNITIVE FUNCTIONS

Intelligence

Intelligence implies both a potential and actual ability. In practice, however, we deal with measured abilities. The use of traditional global measures of intelligence, such as I.Q., has been found to be ill-suited for developmental analysis. A multidimensional approach to intelligence is useful since dimensions (factors) of intelligence differ in their developmental functions over the life span.

A good example of the multidimensional approach is the different trends for "fluid" and "crystallized" abilities, described by Cattell and Horn.

Fluid intelligence includes logical reasoning, associative memory and figural relationships; it is a global intelligence present at birth. It is measured in two ways: (1) by perceptual and performance tests that are "culture-fair," that is, adjusted for persons of differing cultural backgrounds, and (2) by judgment and reasoning tests that are "culture-free," that is, designed to be applicable to all persons, regardless of cultural background. One major characteristic of fluid intelligence is that it facilitates perception of complex relationships in new environments.

Crystallized intelligence is thought to be the result of all that a person has learned in a given culture. Crystallized intelligence includes verbal meaning (vocabulary), numerical ability, mechanical knowledge, well-stocked memory, and habits of logical reasoning. Crystallized intelligence is high on the subtests that are built into

traditional I.Q. tests, such as vocabulary size, analogies, and classification involving cultural knowledge of objects and problems.

Research studies indicate that fluid intelligence exhibits a pattern that closely matches the growth and decline of biological processes (a steady decline from early adulthood onward), although many adults maintain high levels of fluid ability. A number of recent studies suggest that some modification of tests may be possible to bring about improved performance.

Crystallized intelligence, which is principally dependent upon learning and acculturation, is assumed to show an increase all through adulthood and only a slight, if any, decline in old age. Thus, it makes no sense to talk about decline in "intelligence" with age unless we specify the aspects of intelligence at issue.

Results from cross-sectional studies (studies of groups of people of different ages) on traditional I.Q. tests, such as the Wechsler Adult Intelligence Scale (WAIS), have tended to show decline in intelligence from early adulthood. Analyses of many cross-sectional studies using the WAIS conclude that performance subtests exhibit a greater decline than verbal subtests. When educational level is adjusted for in all age studies, verbal skills improve between 25 and 64 years of age, but tasks requiring special skills (block arrangement, matching geometric designs, finding a missing detail in a picture) are not performed so successfully after 40. Intellectual functions that rely on the application of well-learned material still remain intact well into the 60s and 70s while those related to speed and strength begin to decline during the 30s. The important point here is that intelligence, at least that related to culture-specific knowledge, shows little change over the life span.

Test performance of older adults may be modified by a number of important factors. According to some investigators, the greatest decrements in intelligence are exhibited by those close to death.

The terminal stages of life form a distinct phase of aging. Research indicates that sudden declines in mental tests or psychomotor behavior should be considered as indicators of possible serious changes. Terminal decline commonly appears as a sharp break or departure from a relatively stable series of measurements. The reason these may appear in intelligence tests and other psychologic measurements is that the nervous system's integrity is influenced by and reflects somatic changes elsewhere in the body. To this extent, behavior is an indicator of the physiologic integrity of the nervous system and may be more revealing than laboratory measurements of single biochemical or physiologic functions.

Data suggest that the intelligence of most individuals remains constant until at least age 70. Before this age, almost all the observed decline in average intelligence can be accounted for by "terminal drops" among those who did not survive. For those over 70, survivors exhibited some decline but not to the same extent. Studies showing a decline in the average intelligence of aging individuals may have resulted from research artifact: the samples chosen for study contained proportionally more individuals experiencing terminal drops than found in the general aged population.

Conclusions about declines in psychologic performance with age in general also have been seriously challenged by the differences found between cross-sectional and longitudinal studies. Cross-sectional studies, which look for developmental changes by comparing one age group with another,

tend to show functional declines occurring earlier in life. Longitudinal studies, which record changes in the same group over time, suggest maintenance and stability into late adulthood.

Explanations have been offered for these differences. Cross-sectional studies are said to sample age groups (cohorts) from generations that differ in education, health, and nutrition. Thus, differences between cross-sectional groups can be due to age or to cohort experiences, such as the great changes that have taken place in education in the last 70 years. Longitudinal studies gather information periodically from the same people; observed changes from one test cycle to another are due to aging or to some intervening experience. As previously noted, longitudinal studies have shown either no decline in intelligence or much smaller declines than are found in cross-sectional studies. What appear to be declines in intelligence may be changes in skills and environmental input over time.

The fact that our cultural milieu places different expectations and demands upon adults and older adults also relates to observed differences. There is little reinforcement in our society for "good" cognitive behavior for older adults. Changes in intellectual and learning abilities may well reflect lack of reinforcement and/or disuse of abilities. Intervention strategies have been quite successful in increasing older people's scores on intelligence tests.

What does this research mean specifically in real life situations? Clearly, the studies call into question the popular notion about the decline of intelligence with age. They suggest that age-related decline in measured intelligence probably has little to do with performance in

everyday tasks. Unless there is an extensive decline in intelligence, such factors as persistence and a sense of responsibility can compensate for changes in intellectual functioning.

Learning

Learning refers to the acquisition of information or skills. Learning is inferred from performance on a cognitive or physical task. When there is little change in performance, learning ability is inferred to be poor. Whether or not learning ability declines in later life, there is little doubt -- based on most laboratory studies -- that learning performance is poorer in older adulthood than during young adulthood.

A number of factors affect performance: motivation, speed, physiologic stages, set (the way a task is approached), cautiousness, and the use of test instruments or tasks that are unfamiliar or meaningless to the person. It is extremely difficult to separate these components of performance from those of learning.

A major research trend has been to investigate the non-learning factors that vary systematically with age. Inferior performance in laboratory learning situations has been ascribed to the inability of older adults to respond quickly. There are also age-related changes in the spontaneous use of techniques that assist learning.

An important factor in evaluating older people's task learning and/or performance relates to task meaningfulness. Many research projects involve highly abstract tasks which may be meaningless to older people. As a result, they may not exert themselves. When learning tasks are presented in ways that appear meaningful, and with familiar materials, performance has been found to improve. (However, the use of familiar

materials also may produce interference from past learning patterns and thus inhibit the older adult's performance.)

Many researchers believe that older people are less motivated than younger ones, especially in laboratory situations. This lower level of motivation has been used to explain their poorer performance. Newer data suggest the reverse: that older people may be too involved in the experimental situation and this involvement may depress their performance. Studies measuring blood chemistry before, during and after experiments indicate that free fatty acid levels (which reflect activity of the autonomic nervous system and of the adrenal medulla) were higher for older adults (60 and over) than for younger subjects (20-48). Older adults may be more highly aroused than younger ones during experiments and may continue to show such activation beyond the period of testing. This overarousal actually may interfere with learning performance. When the arousal state has been lowered (by drugs or other means) in the laboratory situation, performance has been seen to improve. A great deal can be done to provide optimal learning situations, but there is some question about how effective intervention strategies, which are successful in the laboratory, would be in everyday and classroom situations.

In sum, there is little evidence to suggest a great deal of change in learning capacity over the major part of the life span. Although learning in a slightly slower fashion than do younger ones, older adults can learn effectively and may show very little change in terms of ability to carry out cognitively demanding tasks. Many older adults in their 70s and 80s show virtually no change in functioning. Once again, it is difficult to generalize about older adult functioning because the range of individual differences is so great. It would appear that there is little

reason to suppose that older adults could not benefit from extended periods of education throughout their lives.

There are, however, factors which must be considered regarding motivation and attitude, because these may play a key role in determining whether adults continue in educational endeavors. Our society, because of stereotypes regarding aging, creates "self-fulfilling prophecies." Those who are deterred from attempting to continue learning are unstimulated, dull, and frustrated.

There is a movement away from the belief that education is appropriate only in the early part of life. Growing numbers of older adults are enrolled in full-time, part-time, and continuing education programs. These programs can facilitate the continuing development of the individual and can be viewed as a beneficial form of recreation or leisure-time activity. In order to reinforce participation in lifetime learning, we must overcome stereotypes about the older person's intelligence and learning abilities.

Memory

Although the processes of learning and memory rely on the same underlying mechanisms, it is useful to distinguish between them. Where learning refers to the acquisition of information, memory refers to the retention of information presented at a specific time.

Most recent research findings indicate little or no decline with age in the capacity to store short-term memory. There appear to be age differences in free recall, but much less of a difference in recognition memory. Older adults do better in recognition tasks due to the presence of more memory cues (e.g., the words to be remembered are present and only the correct one needs to be selected).

To retain memory, it must be exercised. The significant point, however, is that the older person must take the trouble to learn material in order to remember it. Strategies such as rehearsal, organization of material and imagery are used by efficient memorizers. Another important area involves "metamemory," what a person knows about his or her memory and memory strategies. Some of the deficits of older adult memory performance may be due to strategy and metamemory components, rather than to basic ability. It is important to reinstate the original learning contexts when it is time to remember. Memory cues provide more context. Thus, it is important that the individual pay initial attention in the learning situation, organize the material in a meaningful way and actively work on the material. Younger people do better than older ones in laboratory tests of memory because they work harder to make fresh material meaningful and thus have more cues to facilitate memory.

In dealing with everyday information, it is clear that the majority of older adults do not have serious memory defects. For those older adults who do suffer memory impairments, training may help to minimize them. If a treatable disease undermines memory, treatment of disease may improve memory. There may be underlying biologic changes that impair memory, independent of disease. Intervention techniques should always be tried, since psychologic changes do not always correspond with somatic changes.

Information Processing

Intelligence, memory and learning operate upon sensory inputs from the eye and ear, among other organs. In the chapter about health aspects we discussed some of the changes that occur in these organs with age. The eye's ability to focus on near objects worsens with age, the absolute threshold of light required for vision increases, ability to adapt to

darkness from light (and vice versa) is impaired, and the cornea may become opaque from cataracts. Auditory acuity tends to decline (especially in higher frequencies), interfering with speech intelligibility. Older adults with relatively normal hearing may have decreased ability to integrate and understand distorted messages. Vision and hearing devices may help to overcome the deficits, at least in part.

Not only is the quality of sensory information affected by age, but the ability to receive, process and act upon it appears to be affected, too. A decreased capacity in the early stages of information processing can lead to misjudgment in later stages. Considerable research supports the assumption that with normal aging the individual is less able to receive and process information from the environment. This leads to a general slowing of behavior.

Two primary sets of theories attempt to explain the slowdown: (a) "peripheral" theories attribute the slowdown to a decrement in the sensory receptor(s), and (b) "central" theories view the decrement to be somewhere within the central nervous system (CNS). While the weight of empirical evidence has ruled out the peripheral theories, the search for a central mechanism of slowdown continues.

Some researchers believe "neural noise" is the cause for the slowdown of information processing. It is assumed that signals from the sense organs to the brain, and/or from one part of the brain to another, can be disturbed by this neural noise.

Others view the slowdown as resulting from the older subjects' having an informational overload due to limited capacity to process the information. This view suggests that older adults are inefficient, rather than merely slow, in processing newly received information.

Another possible explanation is that slowness with age can be attributed to the time taken by the CNS to mediate stimuli and responses. CNS capacity to become activated by sensory stimulation may be diminished in older adults. Yet another theory assumes that the senescent nervous system allows the neural activity induced by a stimulus to persist unduly, interfering with perception of a second stimulus.

Age decrement in performance may also be due to the presence of irrelevant or interfering stimuli. In the "perceptual noise theory" the age decrement is ascribed to inability to suppress irrelevant stimuli.

PERSONALITY

Personality has been defined as a complex, interactive set of psychologic and behavioral characteristics within the human organism. These characteristics are affected by and may affect the individual's biologic and socio-cultural experience.

Many hold the view that a person's personality and reaction to the later life period is related to that person's ability to resolve conflicts in earlier life. Studies of personality types and of ego functioning indicate age-related change, in which individuals may tend toward increasing "interiority," or growing preoccupation with self and lessening involvement with the outside world.

Among the aging population, Neugarten and associates found a variety of personality types that are not related to chronological age. Within these personality types, individuals are relatively homogeneous with regard to degree of life satisfaction. But they vary with respect to the extent and intensity of activity. It appears that personality type is the pivotal factor in predicting which individuals will age successfully.

Personality is reflected in the ability of an individual to come to terms with his or her environment. Personality reflects the person's unique adaptation to past experience and sets limits on that person's response to the present social and physical environment. For most people, life satisfaction does not decline markedly with age, and ability to function and adapt does not seem related to age.

Certain personality types were found to be able to give up role responsibilities with relative comfort and to remain highly content with life. Other personality types experienced the lessening of role commitments negatively.

The following personality types were found:

(1) "Integrated" -- This type had high life satisfaction regardless of the extent of their role activity.

(2) "Armored-defended" -- This type had high life satisfaction when their activity level was medium or high.

(3) "Passive-dependent" -- This type tended to be medium on life satisfaction regardless of degree of activity.

(4) "Unintegrated" -- This type was medium or low in life satisfaction, whether active or disengaged.

MENTAL HEALTH IN LATER YEARS

Disease, important social losses, and long-standing personality characteristics seem to be more important than age *per se* in causing depression or mental illness. Geriatric psychopathology has been defined as occurring (1) when an old person contemporaneously expresses distress, disturbs others, is incompetent, and shows a change from his previous state, especially when this change is rapid and marked; (2) when this

constellation of events is not commonly seen in age peers; (3) when the causes of these events are seen to originate in the subject, rather than in his circumstances; (4) when the events are judged to be maladaptive; and (5) when a treatment is available to slow down or reverse the development of these events. This extended definition allows one to view the characteristics of psychopathology along a continuum.

The definition of successful versus unsuccessful aging and the issue of competence -- one's ability to handle effectively personal as well as environmental affairs -- must be examined when defining psychopathology. Competence may be defined in terms of reality contact, problem-solving ability, intactness of judgment, ability to maintain interpersonal relations, and the ability to maintain "adaptive" modes of functioning. (Adaptation may be defined as the process of meeting an individual's biologic, psychologic and social needs in a continuously changing environment.)

Pathology is the result of failure to adapt to the demands placed on the individual to meet basic needs or to meet basic needs in a way that is maladaptive, i.e., at the expense of pain, suffering and disorder within the individual or within the environment.

Emotional health in old age involves successful adaptation to a number of life tasks. A major task for some older persons is to cope with certain losses, such as loss of spouse, social relationships and social roles, job and related associates, income, mobility, and physical health, opportunity for meaningful work and recognition. Financial resources, housing, health and social involvement are all interrelated with emotional responses and capacities. A positive adaptation would include replacement of some losses with new relationships, new roles or retraining of impaired

capacities. When necessary, the older adult may have to learn to adapt to changed conditions.

Another major task is an identity review. (Robert Butler's term for this process is life review.) Erik Erikson referred to this last stage of development as "Integrity vs. Despair." Many clinicians have discussed the fact that most older people engage in an evaluative review of their lives, weighing their accomplishments, failures, satisfactions and disappointments. The older adult seeks to delineate a final identity as death approaches. A positive resolution allows the individual to integrate his life history and allows a positive or satisfied view of his life work. Some individuals lacking a positive life history may not be able to accomplish this resolution.

Remaining active in order to retain function is another major task. Older adults should be encouraged to maintain physical activities, social interaction, intellectually and emotionally stimulating activities, and self-care capacities. Disuse of these functions can lead to unnecessary physical limitations, social isolation, disorientation and apathy.

For some older adults, maladaptive changes in personality are the result of biologic, social and psychologic aspects of aging. Stresses and losses become too demanding; earlier methods of coping with stress are no longer effective, or accumulated pressures are overwhelming. Grief, guilt, loneliness, depression, despair, anxiety, helplessness, and rage are not unusual and should not by themselves be considered mental disorders. When problems remain unresolved and interfere with daily functioning and cause a great deal of pain, then therapeutic intervention is needed.

There is a fine line at which these problems become severe enough to be called mental illness or disorders. An extensive psychologic and medical evaluation may be necessary.

Older adults may develop functional disorders, those psychogenic problems without apparent physical cause which appear to be related to one's personality and life experiences. These failures in adaptation occur despite intact brain functioning.

Affective disturbances, alterations in personality or mood states, comprise the most common group of functional psychiatric disorders of the later years. Depression -- whether based on mild reactive response to identifiable situational factors or on serious psychogenic states that have no apparent link with external events -- is the single most frequent functional disorder. Symptoms of depression include painful sadness, listlessness and pessimism (manifested as diminished self-esteem) and a gloomy evaluation of one's present and future situation. Older adults also often report such physical symptoms as loss of appetite, significant weight loss, severe fatigue, sleeplessness, constipation or, more rarely, diarrhea. (A thorough medical and psychologic evaluation is warranted for someone reporting this set of symptoms.)

The most characteristic feature of all depressive disorders is that they occur suddenly in persons who have previously gotten along reasonably well. Depression can be triggered by loss of love or a loved one, disappointments, criticism, or other threats, real or imagined.

Severe depressive illness is often accompanied by suicidal ideas. These thoughts may be relatively passive wishes for death or may be the starting point for an active plan to commit suicide. These must be taken

seriously. Suicide among the elderly occurs at a rate more than triple of those experienced in the general population. There is increasing risk of suicide with advancing age, especially among white men.

In manic reactions, less common than depressive reactions, the patient is elated, optimistic and feeling all-powerful. Some drug treatment has been found effective in tempering manic reactions.

In a paranoid reaction, the next most common psychiatric disturbance after depressive reactions, the individual attributes to other people motivations that do not in fact exist. An example would be an elderly person who misplaces a possession and accuses those around him of stealing it. Paranoid ideas are much more common in persons with sensory deficits, particularly with hearing loss or with decreased intellectual capacity. Effective treatment includes correction of sensory or cognitive deficits, provision of a stable friendly and familiar environment, and the use of small doses of tranquilizers.

Hypochondriasis, the next most frequent disorder, is more frequent in older women than men. Seeming to increase in frequency with advancing age, hypochondriasis is characterized by excessive preoccupation with one's bodily functioning or that one has one or more specific diseases in the absence of significant physical pathology. The diagnosis must be made on the basis of negative physical findings and specific psychologic observations.

For older adults, changes in the brain circulatory system or endocrine system can interfere with adaptive responses, leading to changes in behavior or mood. These people are referred to as suffering from organic disorders. Half of all elderly persons with significant

mental impairments have organic brain syndrome due to cell death or malfunction. Symptoms of chronic brain syndrome include disturbances of intellectual and cognitive functioning, especially memory. Other major characteristics are impairments of ability to remain oriented to one's environment, of visual-motor coordination, of learning and retaining special arrangements, and of ability to abstract. The prime characteristic of chronic brain syndrome is its irreversibility. Once brain damage has occurred, there is no full return to normal physical condition. Nevertheless, many of the emotional and physical symptoms can be treated, resulting in improvement of functioning.

Some 10% to 20% of the elderly with the symptoms have an acute or irreversible form of organic brain syndrome. A temporary malfunctioning of cortical cells may be due to metabolic malfunction, drug intoxication, or nutritional deficits. The patient's confusion and other symptoms may cease with the right intervention, such as proper diet. The need for skilled diagnostic and therapeutic intervention is especially important.

Approximately 15% of the older adults (about 3.3 million persons) in the United States suffer from moderate to significant psychopathology. About one million of these reside in various kinds of institutional settings. Active treatment programs exist in some state mental hospitals and are rare in long-term care facilities. Thus, the majority of mentally ill older adults are receiving institutional care, primarily social and custodial care.

When dealing with mental-health issues, practitioners should note that community-service networks and support systems are just beginning to take a strong diagnostic, intervention and supportive approach. Medical practitioners often share the attitude that little can be done for the older

adult. It is imperative that the latest knowledge be made available to practitioners and that every attempt be made to promote maximal functioning in the older adult.

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Chapter IV: Social Aspects of Aging

This chapter concerns what we currently know about some social aspects of aging, what we can predict on the basis of current trends, and what we think may change on the basis of reasonable expectations about both old people and the society of which they are a part.

Because we inevitably have more information about what is and was than about what will be, there is a tendency to indulge in "straight line" thinking about the future--that is, assuming that what is will continue as is with the future. This chapter will suggest a number of notions that tend to counteract that kind of thinking. In any case, however, we must begin with what we know now, as the most solid available basis for understanding the variety of phenomena that make up the social aspects of aging.

THE DEMOGRAPHICS OF AGING

How Many?

There are now almost 24 million Americans over age 65 and almost twice as many (44 million) over 55. Depending on the definition of "old" this group now constitutes between 11% and 20% of our population. Fifty years ago, those 65 and older were but 5% of the total population, while about 11% are 65 or older now.

The proportion of a population in any age group depends upon the size of the other groups. Much of the increase in the number of old people is traceable to gains in life expectancy, but the proportions fluctuate as a function of birth rates, death rates and immigration patterns. Those who are over 60 today were members of very large birth groups, but they themselves had relatively small families (due largely to the Great Depression). This means that even though the number of

old people will continue to increase in the next four decades, their proportion will not, remaining at between 11% and 12% until early next century. But the small birth groups, or cohorts, of 1920-40 are followed by the very large number of children they produced between 1947-57. When these products of the "baby boom" become old--from 2010 on--they will make up between 16% and 17% of the population for several decades, not only because there were so many of them to begin with but also because they themselves are having very few children.

This trend toward overall "aging" of the population is characteristic of modern industrial societies in general. Many Western European nations have even higher proportions of old people than does the United States. Conversely, countries with both high birth and death rates at all ages have much "younger" populations than do the developed countries, with only 3% to 5% of their population in the 65 and over range.

Life Expectancy

This century has seen enormous gains in the average ages to which Americans, whether men or women, black or white, can expect to live. In 1900, life expectancy at birth for white males was 48.2 years, for females 51.1. In 1975 the comparable numbers were 69.4 and 77.2. For non-whites, male life expectancy at birth went from 32.5 years in 1900 to 63.6, and female from 35.0 to 72.3 years. Thus, the life expectancy for the whole non-white population doubled. By far the greatest gains in life expectancy were made by improving health and reducing risk of death during the period of infancy through young adulthood.

Table 1

Life expectancy at birth in the U.S.

	1900	1975
White males	48.2 yrs.	69.4 yrs.
White females	51.1	77.2
Non-white males	32.5	63.6
Non-white females	35.0	72.3

(Source: Bureau of the Census)

Lesser gains have been made at the later ages. Most of these had their effect by the 1950s, so that life expectancy at older ages has remained fairly stable. There is some debate over whether or not further breakthroughs in biomedical intervention are possible (see chapter on Biological Aspects of Aging). Nonetheless, while less than half of all Americans survived to age 65 at the turn of the century, in 1975 this proportion rose to three-quarters of the population, and at the ages 65 to 80, it rose from one-third to more than one-half.

Composition of the Older Population

Sex. As the figures above indicate, women are likely to outlive men. This advantage has widened over time, from roughly three years in 1900 to eight today. This differential appears to be a biological given and not a matter of lifestyle: male mortality exceeds that of females at all stages, pre- as well as post-natal. Some of this difference was previously masked by the typically high maternal mortality rates. Additionally, there has been a great advance in maternal care. In fact, it would appear that the more convergent the life experience of men and women, the greater is the divergence in their mortality rates.

Whatever the reason, the result is a striking excess of females over males at older ages, even though the proportion of males in these age groups was artificially boosted by the large number of male immigrants between 1880 and 1920. The sex ratio--i.e., the number of women per 100 men--in 1977 was: 111 at ages 55-64, 130 at 65-74, 165 at 75-84, and 216 at 85 and older. The projections for the future show additional increases.

Table 2

Sex Ratio in 1977

Age	Number of women per 100 men
55-64	111
65-74	130
75-84	165
85 and older	216

(Source: Bureau of the Census)

Race and Ethnicity. Because of generally higher fertility rate among blacks, a much smaller percentage of the overall black population is old (7.4% in 1975), compared to the age distribution of whites. However, as noted above, blacks also have benefited from the increases in life expectancy and mortality declines which characterize the society as a whole.

In the older ages, the ratio of black women to black men does appear to be lower than that for whites. There is reason to believe that these racial differences are more social than biological, and that black data will increasingly converge with that for whites--if gains are made in eradicating poverty and its consequences.

Those who are 65 or older today include the survivors of the vast immigration of young adult males which was effectively halted by the restrictive legislation of the 1920s. Unless there is some change, this will be the last generation of older poeple to have large numbers of foreign-born, less educated and lower skilled, with traditional expectations of family life. In general, their life expectancy was lower than that for the native-born, but this was more a function of occupation and income than ethnicity for the men, and of high maternity mortality for the women.

The Hispanic population, on the other hand, has had increases due largely to recent migrations (again, comprised of more males than females, typically young adults with high birth rates). Consequently, there are very few old people in these communities--perhaps 3% or 4%. Barring emigration in old age, this population will age in the United States and fifty years from now will contain a sizeable proportion of elders.

Internal U.S. migrations. This is also the last generation of old people to contain large numbers of persons born and raised on farms or small villages. Our population as a whole has undergone a long-term movement to urban centers and then out again to their peripheries. The out-migration of young people from small towns and farm states continues, with the effect of leaving a number of Midwest states with large pockets of elderly people.

Several states have experienced an influx of older people--for example, an increase of over 70% in the proportion of those 65 or older in Florida, Arizona and Nevada in the decade 1960-70. But migration rates for old people are the lowest for any age group in our society. Under 2% of those 65 or older moved across state lines in 1970-71, as compared

with almost 9% of young adults. The regional distribution of our older population is primarily a residual effect of the movement of other age groups.

Taken together with trends in immigration/ethnicity, these data indicate that those who will be entering old age in the decades to come will be much less likely than those currently old to have grown up in small towns, villages or farming communities, here or abroad. They will be more sophisticated, and will have had more schooling (see below). This suggests that they will have less expectation of care from kin and greater reliance on bureaucratic structures, and will perhaps have greater personal resources for coping with the decrements of old age.

Education Attainment. If one looks at the data on high school graduates in the various age groups it is apparent that the older the age cohort, the smaller is the proportion of high school graduates. Compared to the population of adults 25 and over, those 65 and over have consistently lower educational attainment, although the ratio between the two groups has been steadily increasing. While slightly less than half of those 65 and over in 1952 had completed high school, as compared with all adults 25 and over, that figure will rise to two-thirds in 1990. The gap is closing, although it is the nature of modern societies that the educational attainment of successive cohorts increases; the young will always have more schooling than the old and even if the length of education does not change, the numbers who have the opportunity of prolonging their educations tends to increase.

What all this means is that old people in the future may have wider interests, greater articulateness, a heightened awareness of public issues and a leisure time choices which are more varied than those of the

current cohorts. This will have political implications for development of public policies.

Summary. In sum, the basic composition of our older population is undergoing major change. There will not only be a great many older people but also a "new" old person in the decades ahead. While we plan for the well-being of today's aged, we must keep in mind the possibility that other arrangements may be more appropriate for the cohorts to come.

Family Status and Living Arrangements

Women have the advantage in life expectancy, but men have profited from trends in marital status and residential arrangements. Indeed, the same set of underlying factors accounts for both outcomes; if women live longer, fewer men will be widowed or living alone.

Marital Status. The secular trend in the society as a whole has been for increasing proportions of people to marry. But because of the basic sex ratio there are slightly fewer married females than males. In 1976, approximately 95% of Americans had been married at least once. Men tend to marry women younger than themselves (40% of men aged 65 or older have under-65 wives) and to die at earlier ages than their wives. Thus, there is a striking demographic fact among the aged that most men aged 65 or older (76.5%) are married with spouse present, while most women (52.8%) are widows. Even at age 75 and over, 66.7% of the men are living with a wife, compared to 21.4% of women that age. At 75 and over, only 23.5% of the males are widowed, contrasted with 69.7% of women. These statistics also reflect the fact that elderly widowers are seven times more likely than comparably aged widows to remarry.

Table 3

Marital Status Among the Elderly (1976)

(Percentage of those whose spouse are living)

Age	Men	Women
65 and over	76.5%	47.2%
75 and over	66.7	21.4

(Source: Bureau of the Census)

Living Arrangements. We have seen that three-quarters of elderly males (65 and over) in 1976 were living in a household with a spouse present, compared with slightly over one-third of women that age. On the other hand, 36% of the women but only 14% of the men were living in single-person households.

The latter figures represent a substantial shift in the residential patterns of older women: from living with someone else (typically a daughter) to living alone. In 1965, 32.6% of women 65 and over were living in the household of another person, but only 22.8% were similarly located in 1975. Old men are now also much less likely to be living in the home of an adult child (from 15.2% in 1965 to 7.4% in 1975), but for them the alternative arrangement is to have a spouse present rather than to live alone.

Table 4

Living arrangements of the elderly, 65 and over

	1975			1965
	Live with Spouse	Single-person Households	Live in Another's Household	Live in Another's Household
Men	75%	14%	7%	15%
Women	35	36	23	33

(Source: Bureau of the Census)

In percentage terms, very few old people (10%) do not live in some form of household. A fraction, perhaps less than 0.5%, are derelicts or otherwise unaccounted for; the remainder live in institutions, 4.2% of the men and 5.3% of the women over 65 in 1975.

Contrary to the public image, not only has there been very small increase in the proportion of the elderly in institutions, but 95% of the older population live in the community. What these figures do mask are the very different probabilities of institutionalization by age: e.g., for females 55-64 years old in 1975 the proportion not in households was 1.2%, but by age 75 and over the proportion was 10%.

THE ECONOMIC REALITIES OF AGING

Labor Force Participation

There has been a long-term decline in the proportions of old people in the labor force. Longer life expectancy, availability of retirement income through Social Security and pension plans, obsolescence of many skills and a decreasing need for unskilled labor, contraction of farming and self-employment, and perhaps a relaxation of the work ethic have combined to generate pressures on the older worker to leave the labor force. Further, more and more workers (salaried as well as hourly wage earners) are choosing to retire before reaching mandatory ages. There is some controversy over how many would be affected if the age of involuntary retirement is raised to 70. Provided that Social Security benefits would not be delayed, we may suspect that the secular trend toward shorter work lives will continue unabated. Retirement planning programs are said to be attracting increasing numbers of men and women.

In 1950, 46% of men 65 and over were in the labor force; in 1975, 22% were, and it is estimated that by 1990, about 17% will be. The decline is less precipitous for women, but very few were employed at these ages in 1950 (10%) or 1975 (8.3%). As already noted, these trends are not limited to the oldest categories of worker. The employment decline is evident at increasingly earlier ages throughout this time span. This means that each incoming cohort of old people will have smaller proportions in the labor force at earlier ages. For example, in 1960, almost 95% of men between 50-54 were working or seeking employment; in 1976, this figure was below 90%. Comparable data for men aged 60-64 were 81.2% in 1960 and 63.7% in 1976.

Table 5

Percentage of Elderly in the Labor Force

	1950	1975	1990 projection
Men, 65 and over	46%	22%	17%
Women, 65 and over	10	8	

(Source: Bureau of the Census)

We would expect that increasingly favorable pension packages (e.g., "30 and out" for factory workers, and "20 and out" for uniformed service persons), will make retirement an attractive alternative to work. On the other hand, many of these "retirees" may elect to take part-time employment or embark on a second career. For these reasons, the Social Security Administration's projections for the year 2000 do not indicate reductions of more than a percentage point or two from the figures for 1976 above. It is apparently even riskier to predict employment decisions of women than those of men; middle-aged women have <u>increased</u> their labor

force participation rates over the last two decades, and it remains to be seen how readily they will relinquish employment.

The data on labor force participation are very difficult to interpret. The striking reduction in the proportions of older workers could reflect the obsolescence of many skills and types of employment in which older workers predominate, or it could be heralding the loosening of the work ethic in favor of one centered on personal development and pleasure. The knowledge that one is likely to live a decade or so beyond age 60, and that some minimal income and health care maintenance is assured, may lead many to question the value or virtue of continued employment.

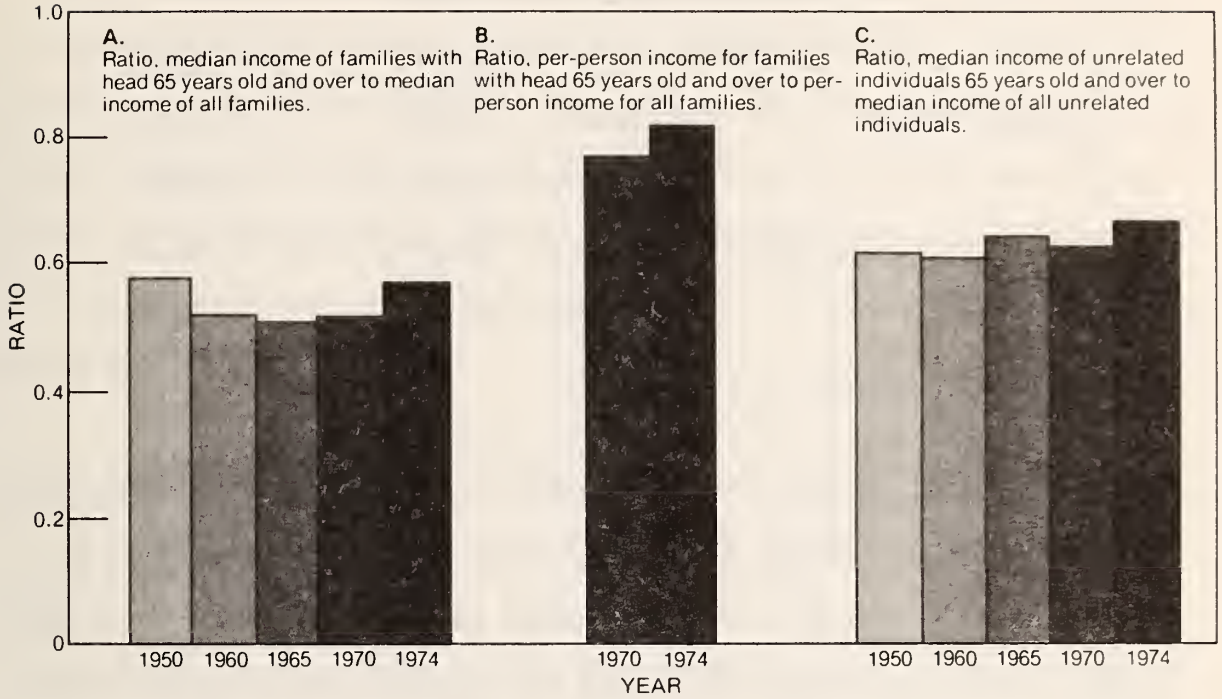
Were these the only considerations at issue, one might safely predict ever-lower participation rates. However, as the next two sections indicate, other factors vitally affect the financial well-being of non-workers and may generate pressures toward continued employment.

Income

As the bar graph indicates, the median income of older families is about 60% that of all families in the United States. The per-person income is closer to 80% because few older families have as many non-earning persons as do younger families. The comparable data for elderly unrelated individuals (defined as household heads who are single, widowed, or divorced) reflects the generally low incomes of unrelated persons at any age.

Figure 1

Ratio of median income for families with heads 65 years old and over to median income for all families: 1950 to 1974



(Source: Department of Commerce. Current Population Report. Special Studies Series P-23, #59, May 1976)

While the older population has a disproportionate percentage of the poor, it should be borne in mind that because most old people no longer have expenses related to raising and educating children, and that many have mortgage-free homes after several decades of residence, some older families may not be as disadvantaged as the comparisons of median income suggest.

If we look at the proportions of elderly whose incomes fall below the poverty level (defined in 1974 as $2,364 for an unrelated individual 65 and over and $2,982 for a two-person family), the following picture emerges:

Table 6

Percentage of elderly whose income falls below the poverty line: 1974

		White	Black
Family Heads:	Male	8.9%	23.9%
	Female	13.0	36.8
Unrelated Individuals:	Male	26.8	44.3
	Female	33.2	68.8

(Source: Bureau of the Census)

Clearly it is best to be male, white, and married. The percentage of these people in poverty is actually below that of the nation as a whole. White women who are married heads of families fare about average in this respect. But to be black and old, especially as an unrelated female, is to be poor in two out of three cases! This condition is highlighted by the observation that of all units below the poverty level in 1974, the aged made up 31% of the white total but only 21% of the black sector, reflecting the greater incidence of poverty among minorities in any age group.

For white, unrelated females are also in the most vulnerable position. Of those now 65 and over, few have had lifetime earnings sufficient either to save for old age or to entitle them to full pension benefits, and if they are survisors of a Social Security beneficiary, they are receiving 80% of that entitlement. Frequently, and this is probably the case for most minority women, the kinds of jobs held and the irregularity of labor-force participation make it unlikely that retired females will have a work-related pension comparable to that of most men.

The relatively favorable income position of men reflects not only higher life-time earnings and more consistent work lives than women, but also the probability of additional sources of retirement income: part-time work, savings, veterans' benefits, or disability pay. It is not uncommon for older men to have a work-related pension as well as Social Security benefits. Non-white men will have been less likely than their white counterparts to have been fully covered by Social Security throughout their work lives, or to have vested pension rights in a particular employment.

Finally, as might be anticipated from all the foregoing, there are marked age differences in income levels: the younger the old person (regardless of race or sex), the higher the income. The older individual has a lower annual income for a number of reasons--low-skilled life-time employment, benefits which do not increase as quickly as the wages of workers in general, or savings which have had to be stretched out.

Dependency Ratio

One important demographic outcome of these secular trends will be a continued increase in the "dependency ratio"--the proportion of income earners to those not producing income, (i.e., dependent children, non-working spouses, and retired persons).

The ratio of persons 65 and over to those in prime work years (males 20-64 and women 35-59) has changed. In 1930 the figure was 0.13, compared to 0.26 in 1975, and a projected 0.39 in 2030. If we assume that most of the former group will be receiving Social Security and that most of the latter will be workers paying into the system, we can speak of an "increased burden" even if growth of the Gross National Product is such as to produce higher revenues from the fewer workers than was the case in the past.

Not only will the dependency burden on workers increase, but the composition of that "burden" will change as more of the elderly retire and live longer, while the birth rate approaches replacement levels. On present trends, fewer full-time workers will be supporting more non-workers in the decades ahead, and a larger proportion of these dependents will be old people than has been the case before. There are, of course, serious implications here for the integrity of Social Security system as well as for the quality of relationships between the old and the young.

THE SOCIAL REALITIES OF AGING

The demographic profile directs our attention to certain consequences of aging for both the old person's social life and for society at large.

Age Distinctions

The data on population growth, life expectancy, and the changing composition of cohorts of old people have led many gerontologists, particularly Bernice Neugarten, to distinguish between those who are 55-75 and those who are over 75. Neugarten speaks of the "young-old" and the "old-old"; the former have characteristics generally associated with late middle age, while the latter more closely resemble the stereotypical "old" person.

When we lump both groups together, we lose sight of many crucial differences. The lumping makes the condition of the "young-old" seem much more deprived than it is in reality and that of the "old-old" less disadvantaged than is often the case.

By failing to discriminate the needs and resources of those at the different age levels and by assuming that there is a monolithic "old age," policy makers are likely to satisfy the requirements of neither group.

More importantly, all who work with and plan for the aged must be aware of the changing cohort characteristics because these mean that there will be different kinds of old people at different historical moments. For example, tomorrow's senior citizen will tend to be "independent" to a greater extent than today's. The trend in this direction will be greater for women than for men.

Whether or not practitioners and policy makers make effective use of the information on cohort differences, it remains the case that we are moving toward what might be called a "two-tiered" old age: an extended period of post-parental joint survival of relatively active, healthy, and financially stable couples, followed by a variable period of widowhood, comparative economic hardship and/or ill health. Many of our assumptions regarding old people and our own aging must be revised.

Images of Aging

There is evidence, both direct and indirect, that old age is negatively evaluated in our society. The direct evidence comes from studies by sociologists, anthropologists and psychologists that indicate that old people are frequently stigmatized, avoided by others, and assumed to have a number of unattractive traits. The indirect evidence comes from the enormous amount of time, energy and money which Americans spend on delaying or disguising the effects of normal aging. The skin creams, hair dyes, face-lifts, foundation garments for men and women, cosmetics, medications, hormones, hair transplants--all betoken a great fear of appearing to age.

Admittedly, it would be hard to make old age seem attractive in a society geared to selling youth, beauty and vitality forever, but a certain respect, understanding and affection are not impossible. To this

end, what might be described as an "old age" lobby has recently become effective in influencing the media: representatives of senior citizen groups, gerontologists, political activists such as the Gray Panthers, and their allies. Also, the Select Committee on Aging in the House of Representatives has conducted hearings on the issue of stereotyping by the media, particularly by television.

The discovery of old age as a "social problem" has itself led to corrective information being disseminated by television, national magazines and other vehicles of opinion formation. Nevertheless, as minorities and women have also discovered, the negative images are often unconsciously perpetuated--e.g., the toothless ancient in Bell Telephone ads or the menopausal harridan of many drug company brochures.

When subjected to empirical investigation, however, many of these images or stereotypes are unsubstantiated. The National Council on the Aging and Louis Harris and Associates conducted a survey in 1974 which found so great a discrepancy between what people thought about the elderly and what old people felt about themselves and other old people that the final report was retitled, The Myth and the Reality of Aging in America. Respondents perceived the aged as beset by many more problems than the old people acknowledged for themselves, but only for themselves: that is, many respondents 65 and over thought that other old people tended to conform to stereotype. The situation in which a large number of individuals each feels himself or herself an exception is called "pluralistic ignorance."

A second major lesson from the NCOA study has to do with the sociological process of "defining the situation." What people believe to be real is real in its consequences. That is certainly the case for those beliefs about aging which lead to lowered expectations that in turn become self-fulfilling prophecies.

But this was clearly not the case with many older respondents: the stereotypes did not keep them from thinking of themselves as different. Nor did respondents necessarily interpret an objective condition as a subjective problem. What emerges is a portrait of resilient, adaptable individuals with positive self-images, coping quite successfully with the losses and decrements of old age. Which is not to say that the aged have no problems: they could use more money, facilities for socializing, safer neighborhoods, respect from others and health care services.

What are often seen as problems of aging may be problems of poverty and its consequences in terms of neighborhood safety, health, resources and coping abilities. And some denigration is probably related to attitudes about women, especially those no longer sexually attractive. Perhaps it is to these more basic conditions that public policy should be directed long before people reach old age.

Social Meaning of Aging

Every society organizes its activities and allocates tasks at least on the basis of age and sex. As an element of social structure, age is only now being fully appreciated by social scientists. The different age groups in our society have very different claims on societal resources. At certain moments in the life course, an individual is expected to fill a particular social position ("status") and emit appropriate behavior ("role"). Being "too young" or "too old" for certain roles is largely a matter of social definition. True, being a parent must await the attainment of puberty, and remaining a worker depends upon possessing certain capacities, but most roles are rather elastic in terms of age appropriateness. Many age norms, or rules and guides for behavior, are written into law: school-attendance rules, ages of consent, retirement mandates. Other norms are a matter of custom and informally enforced through ridicule, withdrawal of affection and other negative sanctions.

Sociologists often explain behavior as conformity to norms held by others. The norms become internalized as expectations of self. We must be aware of the internalized norms when evaluating the activities of old people, since much that had been thought "normal" responses to age-related physical and psychological decrements has, upon closer analysis, been found to be greatly influenced by social beliefs (as in the presumed decline of intellegence functions) or cultural norms (as in geriatric asexuality) or unfounded fears (as in concern about physical activity being harmful).

Many norms for old age appear negative, such as expectations that the elderly should exit from the labor forces, stay out of the way of active (that is, younger) people, and refrain from sex. These norms seem premised on the view that the elderly lack competence and resources. Actually, such a monolithic view runs counter to reality: the older population contains more diversity than younger populations in terms of capacities, needs, resources, and personality traits. Thus, negative and rigid norms tend to be applied indiscriminately to a group that has the widest diversity.

If many of the elderly themselves remain capable, they tend to be undercut societally by being removed from positions of power and respect. This is justified on grounds that they are unable to keep their talents and skills current with changes in industrial technology. This may be true of some elderly individuals but hardly true of all the elderly. At the same time that older people are removed from their industrially-based status positions, they are also faced with changes in family roles. For some persons, this results in loss or decrease in family support. In some respects, today's elderly are victims of their own successes--in

living longer than their forebears, in freeing society from traditional limits that tended to support the extended family, and in having instilled achievement values in their offspring.

How then may the elderly improve their positions? They may negotiate with family members for care and respect. They may shift certain issues to the public level (e.g., providing for income maintenance through Social Security, for organized activities through senior citizen centers, for in-home services provided through public or private agencies). Both approaches characterize the contemporary scene. Family relations are moving to a more voluntaristic than obligatory set of norms, which is the apparent preference of both generations. Most studies show that, in general, aged parents consider sharing a home with an adult child as a last resort, when all other alternatives have been found wanting. The preferred arrangement, and that which more and more older peole are able to maintain, is independent households. From the point of view of adult offspring, the preference is also for separate living arrangements, although most would ultimately take in an ailing parent, certainly in preference to placement in a nursing home, contrary to popular assumption.

Politics and the Elderly

The elderly increasingly depend on government support, and this adds to their interest in politics. More than eight in 10 aged couples and almost seven in 10 nonmarried older persons receive retirement benefits, principally under Social Security, or under other public systems, such as public assistance or veterans' programs. (Private pensions represent a small part of the aggregate income of the elderly population.) Legislation in the housing, transportation, and employment fields also affects the elderly.

Besides the 1935 Social Security Act, perhaps the two statutes most significant to the elderly in general are the 1965 Medicare and Medicaid provisions of the Social Security Act, and, in the same year, the Older Americans Act. Social Security in 1935 established entitlement to an income floor in old age on the basis of retirement at age 65 from the labor force and payroll contributions. The same law established federal aid to states with programs of old-age assistance. Medicare established entitlement, solely on the basis of age, to a variety of hospital services; it also offers coverage of private doctor bills to the elderly who pay a subsidized premium. Medicaid finances long-term care and other health services to the elderly who meet an income test under state programs. The Older Americans Act, still evolving, has created state and area offices of aging that assist individuals with programs for nutrition, leisure activities, education, community service employment, information and referral, and other functions. The agencies coordinate services for the elderly.

These enactments have produced political activity for revisions. Social Security retirement-income benefits have not always kept up with inflation. Medicare, an acute-care program for a population with chronic illnesses, has been extended, though it continues to be criticized for deficiencies in type and extent of coverage, particularly in the area of long-term care. The state and area offices on aging, created by the Older Americans Act, are judged variably effective in developing and implementing programs. Monitoring developments is the Senate Special Committee on Aging, created in 1959, and more recently the House Special Committee in Aging created in 1976. The publications and hearings of these committees continue to raise the nation's consciousness of problems affecting the elderly.

The elderly tend to have higher voting rates than do some younger groups. But only recently has a "senior vote" begun to appear. Political theorists believe the elderly will form an enduring political-interest group, if a sense of unity develops, within the heterogeneous older population. Groups of older persons--often under the auspices of organized labor--have united with various organizations on pertinent political causes, such as health insurance in the 1950s and early 60s. Following the passage of Medicare, such coalitions continue to work together, but shifted their focus to press for Social Security increase, food stamps, housing and other legislation. The "senior lobby" helped save the life of the Senate Special Committee on Aging in 1977.

However, this is a tenuous alliance of groups having separate memberships and goals, reflecting the heterogeneity of the older population. There is nothing like a national political movement or party based on the elderly. One reason is that candidates for office and elected officials perceive a "senior vote" and try to respond to it within traditional political alignments. There is, however, an activist group of elderly persons that is nationally operated, the Gray Panthers. It has limited appeal to persons unused to militancy, as most old people are. The Panther network, with articulate leadership, has impressed observers in its devotion to enhancing the reality and image of old people and its appeals to young people interested in problems of the elderly.

At the grassroots, senior activism presents a mixed picture. An obstacle to activism is the difficulty of assembling many individuals who have physical incapacities and lack personal transportation. Moreover, some aged persons do not think of themselves as "seniors" or as having common age-based problems. But many elderly persons recognize a

common interest in particular local issues: property taxes, utility rates, low-cost housing, senior centers, operations of an Area Agency on Aging. On many of such issues, the elders are joined by offspring and others with a family or "anticipatory" stake in the outcome. On some issues, the elderly may join with poverty constituencies. On other occasions, there may be competition with other interest groups for scarce resources.

Given the proliferation of public programs affecting the elderly, there has emerged a group with interests in lobbying for old people: social workers, bureaucrats, academic gerontologists, administrators of volunteer programs, and members of citizen advisory boards. They tend to identify with the needs of the aged and to measure their own success in terms of expansion of programs and funding.

IMPLICATIONS

This overview of the social aspects of aging has some important implications for the future. First, it seems likely that incoming cohorts of old people will be very different from those which currently compose our aged population: better educated, probably healthier, assured of at least minimal income maintenance and health care, accustomed to independence from kin, and with the potential for political activism.

Second, the perceived processes of aging will be increasingly attenuated. A period of about twenty years of post-parenthood as a couple, which is demographically a "new" stage in the family cycle, to be followed by a variable span of widowhood in somewhat reduced circumstances and declining physical capacities, which is what the concept "old age" conjures up today for all elderly. The perception of aging as a continuum will replace simplistic dichotomizing.

One implication of the foregoing is that the lives of old people will become even more variable than they already are. Designs for living for persons 55 and over will present more choices than available to any younger age group: work will be optional, and for longer periods; once mandatory retirement is successfully challenged; leisure worlds open up; relationships with family members become more voluntary than obligatory; remarriage and other arrangements for personal and sexual satisfaction will be accepted. And if those who perceive imminent value shifts are correct and the work ethic is giving way to an emphasis on personal growth and satisfaction, many old people may even enjoy the kind of life we have just described.

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General Comments

Among major information resources are journals published by the Gerontological Society: Journal of Gerontology, with reports on recent medical, biological and experimental psychological research as well as sections on social gerontology and behavioral studies; and The Gerontologist, a social-science forum covering research findings, theory, and social issues.

Other periodicals of interest are Aging (a federal monthly publication), the International Journal of Aging and Human Development, and Geriatrics, respectively concerned with social services, psychology, and medicine.

Chapter V: Cultural-Anthropological Aspects of Aging

INTRODUCTION

The society in which one lives and the culture or subcultures one shares do have an impact upon aging. Information about the relationships between aging and culture is particularly important in the United States, where there are many ethnic communities and subcultures. The practitioners needs to know how society defines and treats an older person according to his or her ethnicity, social class and social race category. How does being a Mexican American or black affect the experience of aging?

Some anthropologists are especially interested in the social relationships affecting the elderly and whether these relationships vary from culture to culture. Much of the material in this section stems from research ethnographers. These are individuals who live with the people and groups being studied. It is believed that by living in the society being studied, the scientist can better understand individuals' lives in all spheres--economic, political, kinship, religious and social class. A great deal of information can thus be obtained about social relationships within that society.

We are particularly interested in these social relationships surrounding the elderly. These relationships can work to support or to weaken the individual's ability to function independently. What practitioners, policymakers, and planners most need to know is how to provide assistance without destroying what is supportive, without magnifying what is destructive.

We will first discuss social network systems as a concept that includes the family and distant kin. The place of the individual in these systems, as defined by roles and statuses, will be next on our

agenda. Then, we will look at support systems. Finally, we will look at the varied reactions the elderly display to aging in the context of modern society, especially in a culturally diverse country like the United States, whose minority populations have different ways of coping with aging.

THE FAMILY

Primary Kin

Most elderly persons--like other people--are embedded in a web of social relationships through the family, religious organizations, business or work place, and other social institutions. These webs, or social networks, change throughout the life cycle but, for the most part in the United States, the family remains one of the most significant areas of involvement. At the same time, one's roles and relationships change throughout the life cycle, as do the expectations people have of one another's behavior. In virtually all societies, the aged increasingly become takers rather than givers of help as they weaken physically. Despite a variety of contacts in their networks, the elderly rely most on the circle of kinsmen.

In non-industrial societies, families are the primary source of security for the older person. Kinship is the predominant institution, performing economic, political, and religious functions. The most salient difference between families in non-industrial societies and those in industrial ones is economic. Industrial families are primarily units for consuming goods and services; non-industrial families are both consumption and production units. In agricultural societies, the domestic group usually owns the means of production. Access to resources is attained through the senior generation. Elders may withdraw from productive activities but rarely relinquish control by transferring all the

property to juniors until death. This assures a secure old age. Transfers prior to death are linked to obligations toward the old. Either way, the fate of an individual in old age in most non-industrial societies is dependent upon the wealth and sometimes the number of his offspring.

In an industrial economy (such as the United States, where the vast majority of families do not control the means of production), is the security of the elderly diminished? The old in industrial societies are widely believed to be neglected by their families. Many theorists suggest that the aged are not as integrated into industrial societies as they are in non-industrial ones. However, research of the past decades indicates that this is not the case. Despite the effects of industrialization--including some geographic and social mobility, separate households, and the fragmentation of extended families--the majority of older persons remain in touch with their families and kin networks. This is particularly true of minority populations. The proximity of family households, the frequency of contacts and the quality of relationships indicate that family life is not dead in the United States nor are the elderly necessarily isolated from their families and detached from the social system. Indeed, family life is an active and important portion of the older person's network.

In 1975, the majority of U. S. elderly lived in a family context. About 80% of the men and 56% of the women were members of families. The vast majority of U. S. elderly maintain independent dwellings either alone, with a spouse, or with a sibling. Three-generation families under one roof are in the minority. They reflect poverty, shortages of housing, or the efforts of relatives to prevent the institutionalization of an infirm elder.

The fact that the elderly live independently does not mean they are isolated. Most older people (75%) have at least one living child and live less than an hour away from them. In some studies, 80% of the older parents reported seeing a child within the last week and 60% had seen one of their children within the past two days. Meaningful relations can occur when kin do not live in the same house or have face-to-face interaction. Many older persons report phone calls and correspondence with a relative--mostly children.

In sum, three out of five older Americans apparently are part of a modified extended family in separate but interacting households. Another one in five of the aged is a part of an extended family with a proximate residence or multiple households in one dwelling. The final one in five is in nuclear families, neither living near nor receiving support from kinsmen. The latter, usually from the urban middle class, is probably younger and in better health. About 5% of older Americans have never married. We have just recently begun collecting data about the aging pattern of these never-married older persons.

As age and chronic illness increase, the proximity patterns become more predominant. This is generally true for both the stable working class and for the middle class. Working class persons live near kin throughout their lives. The suburban middle class individuals maintain loose ties with kin during their young adult years, and rejoin kinsmen in middle age and the older years. In the middle class, residential proximity is not as great as that of the working class, but the frequency of contact is similar.

These patterns reflect an idea often expressed by older parents and their children: maintaining independence and privacy to avoid the

strains of intergenerational living, but at the same time to be concerned with each other's needs. Indeed, as parents age, children tend to provide emotional supports, assistance with maintenance activities, and occasionally financial help.

One of the common myths of industrial societies is that families abandon the aged. Yet, the data show that there are more impaired old people living in the community with the help of children and other kin than there are living in institutions. In 1975, approximately 5% of older men and women were institutionalized. This does not mean, of course, that there are no isolated, lonely, poor, and chronically ill elderly. It is estimated that one million elderly have no surviving kin and hence they lack the support that this portion of the network entails.

Distant Kin

Beyond the circle of primary kin (spouse and children), there is a host of more distant kin. The exigencies of industrial economies have worked against such elaborate structures as clans (which are found in less industrialized societies) and in favor of the more loosely connected family units. In industrialized society, because of population changes (longer longevity rates, younger age of marriage, and higher marriage rates), the kin network of the older person may have more people of the same generation and have more descendants than in pre-industrial society. The network may have up to four generations. It is not unusual for a person in the 60's to have a surviving parent in the 80's. Most older Americans (80%) have living siblings. Three out of four have a living child. Seventy percent of the elderly are grandparents and an additional 40% are great-grandparents. These changes have important implications

for the structure and density of kin networks and for the development of domestic units.

For the elderly, the more distant kin are often exactly that--distant. Even grandparenthood is a relatively inactive role for most people over 65. They were grandparents as early as their 40's and 50's and by the time they are 65 or 70 their grandchildren are adolescents. On the other hand, when there are no primary kinsmen, a dense network of distant relatives may provide a number of substitutes.

ROLES AND STATUSES

As we discussed in the Social Aspects of Aging chapter, the parts we play are our roles, and the positions we hold are our statuses. These entail rights and duties and expectations of appropriate behavior. Roles and statuses of the aged are so highly variable in differing cultural contexts as to make generalizations almost impossible. One generalization, however, is safe. There is no one role and status of being old in any known society. The configuration of roles and statuses comprising an individual's network changes as he or she ages. Statuses and roles are also highly variable within the older population.

In the preceding sections, we discussed the portion of an individual's network which is most significant for the older person--kinship. We examined the patterns of roles and statuses which characterize a majority in industrial cultures. An older person's statuses and roles, however, are not restricted exclusively to those he or she calls "relatives."

Only a portion of life in industrial cultures is conducted from and within kinship. Most individuals daily leave this institution to work in factories or corporations. With retirement occuring for the majority at about pensionable age, this component of his or her network

is truncated. Roles with former colleagues, often characterized by instrumentality (personal usefulness), may be forgotten or are transformed into friendships exclusively based on mutual interest and concern. In addition to kinship, the remaining portions of the network include loosely structured friendship linkages and voluntary associations.

Friendships are part of a continuous life pattern. Often losses are reported with age because friends died or moved away or the older person simply had trouble keeping in contact. Some losses are replaced by new friends. One of the attractive features of retirement communities or age-concentrated residential settings is the availability of age peers. An integrated friendship network may grow. The circle of friends tends to be larger in the wealthier classes. In the stable working class, relatives are also friends. Females report more friends and greater intimacy with them than do men.

Friends and relatives, especially primary relatives, represent complimentary parts of the older person's network. Relatives tend to take precedence over friends, as has been observed again and again in public housing for seniors and in other age-homogeneous residences. Relations with relatives are based on the emotions and sentiments developed through living together, while friendship is based on reciprocity (mutual help) and sharing of interests.

Patterns of membership and participation in voluntary associations are shaped by lifelong network involvement with such groups. The majority of the elderly do not belong to or participate in voluntary associations, except for religious organizations. If a person was active in such organization in younger life, he or she remains so until the 70's. Membership and participation by the elderly in political groups are not well

understood. Considerable variation is noted by social class and according to context.

Religious and political networks have different meaning in small towns and big cities. Of particular interest is involvement of an increasing number of older people in the senior centers, although they are still a minority of the total older population. These centers aim to provide a mechanism for increasing the social network and reducing isolation. A majority of the members of these centers, however, are lifelong "joiners." they indicate that they join because of the content of the program, not for social contacts. In retirement communities, formal voluntary roles and organizational responsibilities are formed around common interest by residents or allocated to them through residents' associations. In these contexts, social participation generally is high and the responsibilities usually are widely distributed.

SUPPORT SYSTEMS

The elderly who reside in institutions, who are isolated, impoverished, disabled, and often mentally impaired have been recognized as most in need of help. Institutionalization becomes necessary because the elderly person's network and resources are depleted or inadequate to sustain him or her in the community. When the family can no longer cope with chronic disabilities, its younger members serve as brokers for the older person with social-service bureaucracies to arrive at the best possible solution to the immediate problem.

Friends and neighbors, too, can form an important component of the support system. Mutual-aid networks are a prominent feature of the integrated friendship networks in age-segregated housing. Even in the inner city, the elderly living in hotels have complete social networks providing

emotional supports and assistance. These networks may be mobilized when needed. Indeed, they help many older persons to maintain independence despite increasing disabilities or periodic crises that, without friends or family, would necessitate institutionalization.

Contrasting with this optimistic picture of the networks of the community-living elderly is that of the isolated and institutionalized. They lack an extensive kin network. Being sicker than their age peers and living in poverty, they need help the most.

CULTURE, LANGUAGE, AND THE ELDERLY

Categories and labels serve as shortcuts in thinking. They often hide important variations. The way in which we use language may undercut our objectives of giving aid and may cause caregivers to ignore persons with soluble problems. This is particularly true of persons we categorize or label as "old."

The heterogeneity of the over-65 population is far more apparent than any homogeneity. "Over 65" refers to a group with a 30-year span. Consequently, the alert caregiver approaches the elderly person by trying to find out what are his or her specific characteristics, rather than by immediately basing plans or judgments on the label "elderly."

Language has implications for the behavior of older people and of those who deal with them. It is germane to consider the issues of linguistic barriers to communication, age as a categorical dimension, and the behavior of those labeled "old."

Linguistic Barriers to Communication

Although language is the medium for the transmission of complex information, there is always ambiguity and sometimes miscommunication. The problem is exacerbated when linguistic differences exist between the

individuals trying to communicate. In many cultures, the older people do not speak the same language as their juniors. In parts of the modernizing world (for example, rural Mexico) the elderly tend to use more archaic, more formal, and more complex constructions, and are more monolingual in the indigenous language than the young adults. This is a product of cultural change. The same may be noted for portions of American society. Many of the individuals currently over 65 are foreign-born or are members of non-English-speaking ethnic groups. Often they have little fluency in English. In approaching a service-providing agency for help, they must rely upon bilingual persons as brokers and translators in obtaining information and making decisions. Many English-speaking minorities use non-standard English, which is superficially similar to standard English. Cultural misunderstanding therefore is likely. The legalism of the bureaucracy, not immediately compatible with colloquial English, presents a communicative problem for all ages, but one that is more critical for older persons. They tend to take more care in processing information before acting.

Age As a Categorical Dimension

Changes related to aging occur in all cultures. Age is an elementary component of a person's identify. In most cultures, boundaries between age categories are imprecise. Age becomes increasingly ambiguous in industrialized cultures because of their differentiated institutional structure and heterogeneity. Divisions of the life cycle are highly variable with even more variation in the terms used to describe them. Even when asked to rank the terms "middle aged," "elderly," and "old," the responses of Americans show little agreement.

This does not mean that age is unimportant in industrial societies. People are very aware of age norms and a social "clock" in calibrating

status change. The age categories they used, on the other hand, do not display such agreement. One should not be surprised or amused to hear 88-year-olds declare themselves "middle aged." They probably are.

Behavior And the Category "Old"

The term "old" has negative connotations engendering the images of maladjustment, dependency, chronic illness, and institutionalization. In some samples of the older population, as few as 20% identified themselves as "old," while the majority (50%) claimed they were "young" or "middle aged." Positive and negative labels shape behavior in subtle ways by evoking stereotypes and folk myths. For example, an attitude of fatalism in potential helpers is often evoked when the person is classified as "old."

The cliche that the old person necessarily is "failing" tends to go unchallenged. Psychiatrists and therapists, assuming that old people are set in their ways, prefer to work with the young. Physicians direct more energies to the treatment of younger patients because recovery seems more probable. This attitude is reinforced by the myth that the diseases of old age are incurable, although many may be relieved through timely medical and psychological intervention.

The term "old" and its connotations do not affect only the people who may help the older person. Old people are more reluctant than younger persons to seek out any kind of medical care. The old often seem to consider their physical and mental problems to be a "normal" condition of aging. Thus, many of the chronic problems of older people go untreated or unrecognized until they result in institutionalization.

PRESTIGE, SELF-ESTEEM AND CULTURAL VALUES

To have a positive identity, to have high self-esteem, and to be a valued person are desirable, apparently universally-held goals. Research has demonstrated that positive self-images are related to mental health and social functioning. Selves do not develop in a vacuum and have no meaning except in relation to other people and to the cultural standards they share. We cannot hope to understand why a person values himself without reference to the standards of his culture. Similarly, the prestige of a segment of a population, such as the elderly, can only be understood by reference to these standards.

Societal Prestige

Recent cross-cultural studies have investigated the effect of industrialization upon the elderly as evidenced in the manner in which others interact with the older person.

Roles and statuses generate prestige. An older person is not granted or denied prestige simply because she or he is old. Four basic "prestige generating" components of statuses have been isolated:

(1) advisory, as manifest in the degree to which the advice or opinion of the older person is sought and actually heeded;

(2) contributory, as apparent in the degree to which older people actually participate in social activities and make contributions to them;

(3) control, as seen in the degree of direct influence an older individual exerts over others through a monopoly over resources, ritual or knowledge;

(4) residual, as in the degree to which prestige is retained through association with former statuses and competencies.

Any one of these components is sufficient to generate prestige for

the aged. However, the structure of a society determines the operation of, and expression of, the social-status and prestige generating components for the aged. The prestige of the older person appears to be reduced in societies characterized by economic heterogeneity, dissimilar father-son economic interests, supra-kin economic activity, independence of nuclear families, early transfer of family resources, roles offering influence to the young; and bureaucratization of ritual, political and judicial functions. Since most of these features are associated with industrializing societies, the conclusion is that modernization is associated with lower status for the older person.

It seems a paradox that societies with the greatest productive capacities, the most sophisticated health technology, and the most affluence should be associated with a lower prestige of the aged. Many of them have spent much of their lives in working to produce the wealth. The reason for the paradox lies in the social structure that affects the roles of young and old. Demographic changes, associated generational competition for jobs, and a continually changing demand for skills (favoring the young) often leaves the older worker obsolete. The institutionalization of retirement is the result of these processes.

Many factors associated with depressed prestige of older people in industrializing societies are related to economic factors. Mature industrial systems however, appear to support higher prestige for the elderly, especially as cohorts having better education, health and finances reach old age.

Cultural Values and Self-Esteem in Later Life

Observers of American society have been struck by the emphasis on rugged individualism, freedom and independence. Something is considered wrong with the dependent person. Virtually all American elderly hope to

avoid becoming dependent and a burden to others. Chronic dependency, voluntary or involuntary, borders on freeloading, which is an American "no-no." In many non-industrial societies, the roles and statuses of older people enable them to give something of use to others. Thus, they can take without remorse. As we have seen in industrialized societies, the prestige-generating components of the statuses of the older person are reduced and what they have to give is little valued. When the help of other is needed, old people have little to give in exchange for the help. Reciprocity is out of balance and integrity and self-esteem are jeopardized.

When increasing age, physical frailty, and associated problems necessitate the help of others, most older people find themselves in an impossible conflict. Many will deny they have problems or refuse to consider help. Others become hostile to those who can and will help. Some will simply withdraw in an attempt to buttress their self-esteem. Where prolonged dependency is at issue, there are no happy compromises between the generations. Values do not sanction it. Requirements quickly develop.

The emphasis on rugged individualism masks the fact that all roles are reciprocal and have their dependencies in a complex society. Some observers see shifts away from the work ethic, which has reinforced individualism. If the interdependency of roles is recognized, then perhaps parents will have some consolation in that their children are competent, and children can assist simply as a matter of kinship. Indeed, kinship data indicates that this is the pattern worked out as "intimacy at a distance" and help when needed in old age.

AGING IN A PLURALISTIC SOCIETY

Older people in a heterogenous society such as the United States are not all the same. Attributes present earlier in life persist into old age. Being old and rich, or old and powerful is different from being old and poor. It is not the same to be old and white; old and black; old and Hispanic American (Mexican, Cuban, Latin American or Puerto Rican); old and Asian American; or old and Indian. To be old and female is different from being old and male. Differences exist if one is old and resides in an inner city or in a rural area; or if one is handicapped. The question we should first ask of the older person is the same we ask of any other adult American -- what kind of American?

Many elderly persons are impoverished. We seldom recognize, however, that the elderly are over-represented in the very rich segment of the U. S. population. For example, the average age of millionnaires in the United States is 60, and 50% are female. An unusually high proportion of the political offices are held by older people. Through the seniority system in most legislative bodies, some of the oldest officials wield tremendous influence in legislative decision-making. The elderly exert a disproportionate influence in economic affairs through leadership in trade unions, the upper echelons of corporations, and through vast private fortunes.

On the other hand, the elderly are also over-represented in the poorest segments of the population. These are the people most likely to use and be in need of special services. Poverty, although it is the most salient variable, is not a common denominator.

Many of the lowest-income old are members of ethnic and minority

groups. They have cultural and historical backgrounds different from that of the Anglo population. And they have experienced a life-time of discrimination and stereotyping. Effects of this discrimination are seen in reduced longevity. For instance, in 1970 approximately 10% of the U. S. population was over 65, but only 7% of black, 5.7% of Indians, 3.2% of Mexican-Americans, and 2% of Puerto Ricans were over 65. Only one in three Indians reaches 65, half the longevity rate of the general American population. Discrimination is also seen in lower retirement income. Social Security benefits are often unavailable to minority persons because of chronic joblessness or work in occupations that, until recently, were not covered by Social Security.

Of the 6.1 million widows in the United States, many suffer discrimination against their sex, their marital status and from male-oriented pension plans. Upon the death of spouse, she may find her income reduced when pension benefits are terminated; her social network disrupted; and her identity shaken. Widows comprise the largest single group under the poverty line.

In accommodating to poverty and discrimination, ethnic minorities draw on cultural strengths, including values and social networks. A "structural intimacy" -- or group cohesiveness -- characterizes the culture of many working class and ethnic subcultures. There is an emphasis on the solidarity and continuity of the group rather than on any immediate benefit membership may bring to the individual. One does not stand alone in a competitive arena judged by universal and abstract criteria. Instead, one is embedded in a network of mutually binding relationships; one is judged by role performance in a social

position. This, of course, has implications for the aging process, cultural styles of aging, and for the self-esteem of minority elderly.

In adapting to discrimination, minority groups have institutionalized "coping mechanisms." These increase the use of social networks. Many poor minority older people live in socially-integrated communities with supports from kin and community sources. For instance, the Mexican-American family is all important in meeting its members' needs through financial assistance, exchange of work, and reliance on older members for advice. Social services are sought only as the last resort considered shameful to seek help outside of the family. The impact of religious and other voluntary associations on the lives of the ethnic older person may be considerable, especially in terms of maintaining the highest degrees of life satisfaction.

The kin network is also extensive among the largest minority group, the blacks. The elderly, especially women, are often responsible for strong family bonds. In a poor family, the older person may hold influence because that individual makes a financial contribution to the family out of his or her Social Security pension, private pension funds, or benefits from welfare plans.

Minorities have been subject to the forces of the "melting pot." Change has been associated with loss of roles and declining prestige for the older person. The young -- in seizing new opportunities and trying to transcend minority status -- find themselves in many ways culturally different from their parents. Networks may disintegrate. For example, in Oklahoma and elsewhere, older Indians are being displaced by younger, better educated Indians in tribal management. However, there is no evidence that the old are being abandoned by their families.

ETHNOGRAPHIC ASPECTS OF AGING

Contrary to early expectations that closed "geriatric ghettos" would form in retirement communities, viable groupings have emerged in these settings. Age-limited or age-graded communities appear to be attractive to some older people. There are long waiting lists for public housing for the elderly, and age-restricted condominiums and retirement communities have increased in the last 20 years in the Sun Belt. Developers offer a package that provides for maintenance of social organization through club houses and other facilities. Thus, social organization results from planning.

Communities in these locations may be described as a combination of friendship and factions. Friendship cliques form on the basis of residential proximity and mutual interest. Factions define social boundaries for limiting friendship networks. (In French retirement communities, political identification is the basis of factions and networks.) Factions may depend on interests in administrative policy as it affects everyday living. Factionalism does not appear to be socially disruptive, except perhaps to those who try to administer and coordinate. Instead, it may be socially creative, by organizing and articulating the concerns of residents. Morale has been found to be much higher among persons who select retirement communities than among those who select age-integrated housing. In age-segregated communities, social sanctions of "acting one's age" often are relaxed as residents find pleasure in dancing or bike riding. There is not ethnographic evidence of residents' whiling away their time. Death is accepted rather than denied, by participation in funeral rites. These assure the elderly person that his or

her own death will not go unnoticed.

Some elderly concentrate -- not through planning -- in the inner city. Those living in single-room occupancy hotels are often physically and psychologically sicker than their age peers. Yet they survive. Until very recently, very little was known about the social networks which meet the needs of older people in the decaying centers of American cities. Evidence indicates that isolation and lack of significant networks among this elderly population is a myth. Networks were found to be significant, but also to be of low density and, interestingly, highly compartmentalized. The organized segregation between components of the network (i.e., drinking buddies, tenants, kinsmen, hotel management, social worker) is seen to be a result of the desire for independence and the associated goal of limiting the intervention of institutions in their lives.

As a consequence, these networks have an appearance of shallowness and superficiality, since one portion of the network is not cognizant of other components. Intimacy and the willingness to invest themselves in other people is characteristically lacking in the social relations of the single-room occupancy hotel resident. This may be a response to lifelong difficulties or to different ways of meeting needs for intimacy and different meanings of intimacy. Most importantly, older people in inner-city hotels are able to cope precisely because of this kind of urban environment. They do need help, but not the kind of help that would totally destroy the resources and adaptations that have been worked out.

IMPLICATIONS

How may our knowledge create more effective programs for meeting the needs of all older people?

Programs of social or economic intervention are only characteristic of and within the capabilities of modern societies. In the more primitive societies, the security of the old is contingent upon family and children. Social services for the old are primarily 20th century phenomena of industrialized societies. Applied anthropology may help in attempting social interventions for the elderly.

Applied anthropology shows us that failure in effecting change often results from cultural misunderstanding. This may be a misunderstanding of what will work or what is desirable to the target population. Moreover, organizations, agencies, or individuals who have a vested interest in the target population may perceive a proposed change as a threat and thereby block the program. Unless the total context is understood, it is difficult to present the program in an effective and meaningful manner. Any social intervention program must be built upon sound understanding of the target group and its culture.

Familiarity with a culture has many important implications for designing programs and services to resolve problems associated with aging. First, for some people aging is defined as a social problem. Social problems, however, are culturally defined. Many of the social problems of age have been culturally created. This does not mean that there are no problems associated with age. The aging process, chronic illness, and decreased income are real, regardless of how they are interpreted. When dealing with a vague cultural domain such as age, fraught with folk myths and stereotypes, one must be aware of one's own cultural biases and their implications for the problem group.

Secondly, the older population is heterogeneous. The 65th birthday

does not eradicate all differences in social stratification, ethnicity, race, sex, or experience. It is unreasonable to expect that a single program suffices for all older people.

Another lesson of applied anthropology is that successful programs build upon existing resources without destroying them. Since older target populations are so varied, a necessary first step is to determine the resources and expectations of a target population. Although questionnaires are vital in documenting need, they should be sensitive to the culture of the target population. The questions should measure the resources, needs, and goals of the people to be helped, not what service-providing bureaucracies think are important.

Finally, applied anthropology indicates that piecemeal programs are most ineffective. They make little or no impact on the needs of those they seek to serve. In the case of the elderly, piecemeal approaches often lead to unnecessary demands upon institutional and custodial services. An ideal is a comprehensive system of services with alternatives to reinforce the existing networks of the older person who needs help. Such a system could coordinate health and social services; take preventive measures; preserve independence, and avoid premature reliance on institutions.

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Chapter VI: Future Prospects for the Elderly

INTRODUCTION

This consideration of the future prospects for the elderly looks to that future under a number of headings. The first heading is future demography. Next, the implications of these demographic projections for the economy are considered, with particular attention to effects on retirement systems. This is followed by a consideration of other impacts, including impacts on social values. Finally, impacts on policy, planning, and service delivery are considered.

It is necessary for these purposes to focus attention on a single future, the one deemed most likely. This most likely future is one in which there continues to be steady, but not spectacular, progress in dealing with the principal diseases of the elderly--cardiovascular disease, cerebrovascular disease, and malignant neoplasms--for the remainder of the century. Thus, by the year 2000, life expectancy at birth will be about 80 years--up about six years from the 1975 level.

In this future, however, the maximum age to which people can expect to live--the human life expectancy--does not change appreciably by the year 2000 (although there is by then some reason to expect significant progress in the retardation of aging during the next quarter century, i.e., by the year 2025).

Such a future is neither the most hopeful nor the most pessimistic of those that have an appreciable chance of coming about. It is conceivable, for example, that life expectancy in the United States may even go down in the next quarter century. This could happen if various adverse environmental influences combine to produce an upsurge in the incidence of deaths from cancer and cardio- or cerebrovascular disease or if political upheavals, war, and economic disasters increase death rates and lower life expectancy.

Conversely, it is also conceivable that there will be breakthroughs in the control of the aging process much sooner than now seems likely, so that by the year 2000 we may see some people--particularly younger ones who have not yet undergone the ravages of the aging process--who can reasonably expect to live well beyond age 100.

Which future materializes depends in part on factors we cannot hope to control now (such as the biomedical ability to control aging) and in part on factors very much in our control (how much funding we allocate to life extension). The decisions we make now can play a large part in determining the opportunities and problems that will confront us. Our decisions will affect the kinds and amounts of services that will have to be delivered. Consequently, the future outlined below is not one that should be seen as inevitable, to be awaited passively. Even avoiding decisions and letting matters drift will be a kind of policy choice, with its own consequences. We cannot avoid making a choice about such phenomena as future demography, retirement systems, economic structure and stability, and social values.

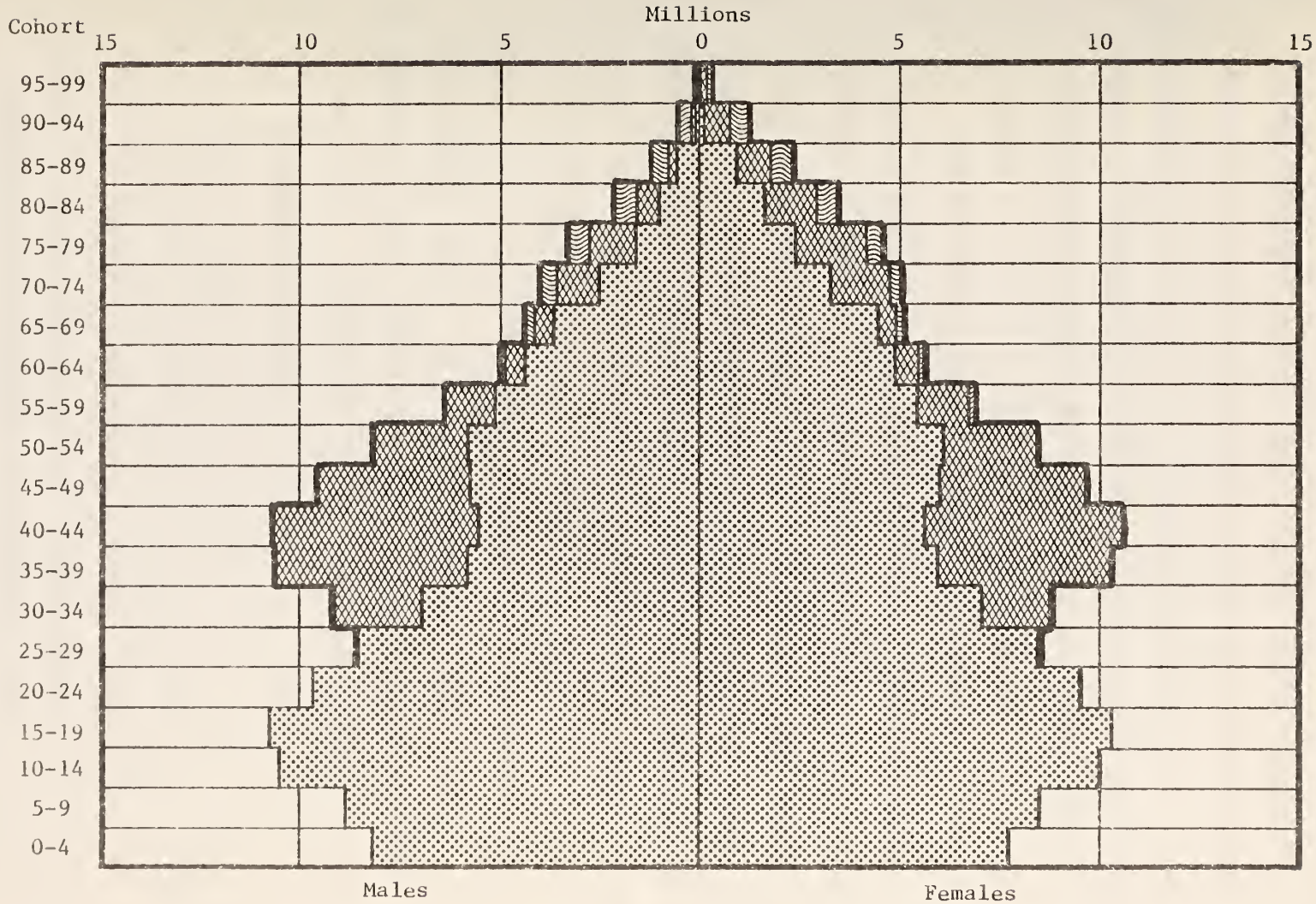
The funds and effort we allocate to basic research in the biomedical sciences and to related efforts, such as the training and support of researchers and the creation and maintenance of laboratory facilities, may well affect the magnitude of the problems we will face a generation from now. There are important issues that arise here that pertain to trade-offs between (1) allocating our far-from-unlimited resources to serving the needs of the elderly directly today (and tomorrow) and (2) allocating--with less assurance that our expenditures will lead to practical benefits--the same resources to research in hope of technological fruits that will reduce the demands the elderly make later on our service-

delivery systems. Those involved in the delivery of services to the elderly should be aware of the policy issues that lie behind the presentation below of a single, "most likely" future.

DEMOGRAPHY

Figure 1 shows the U. S. population distribution by age and sex (a) in 1975; (b) for ages 25 and above, as it would be in the year 2000 if 1975 death rates persist unchanged; and (c) for ages 25 and above, as it would be in the year 2000 if there is the anticipated reduction in death rates due to heart disease, stroke, cancer, and related diseases.

Note that the population distribution in the year 2000 for persons less than 25 years old depends on future birth rates--about which we lack information; this is why the lower part of the population distribution in the year 2000 is not included in Figure 1. That figure presents estimates for the year 2000 that depend only on projected death rates (plus the assumption that the net balance by sex and age of immigration and emigration will not change appreciably).



1975

2000: excess over 1975 population for persons over 24, assuming 1975 death rates do not change.

2000: additional excess for persons over 24, assuming death rate reductions (bold outline).

Figure 1. U.S. Population Distributions by Age and Sex

Figure 1 shows that most of the future increase in the numbers and proportions of older Americans will simply be due to the aging of the post-World War II baby boom. In 1975, as the figure shows, that bulge was centered around ages 15-19; by the year 2000, 25 years later, it will be centered on the 40-44 age group. Because in 1975 there was a second, smaller population bulge centered around the 50-54 age group, there will be appreciably more Americans aged 75-79 and in age groups just below and just above that range in the year 2000 than in 1975.

Figure 1 also shows that the anticipated increase in the life expectancy of older Americans will only marginally raise the number of older Americans beyond that expected even if 1975 death rates do not decline. The greatest demographic impact of the expected decline in death rates will be for the oldest age groups. Although the effect will not be large in absolute numbers, it will be very substantial relative to the small numbers of people who now survive to advanced old age.

In 1975, life expectancy at birth in the U. S. had reached 72.5 years. The projected changes in death rates shown in Figure 1 would raise it about 9% by the year 2000, to roughly 78.5 years. In 1975 roughly one in every 10 Americans was 65 or older--about 22 million. With no changes in life expectancy, by 2000 there will be roughly 33 million. The proportion they will be of the total population will depend, of course, on future birth rates. Even if we conservatively assume that birth rate will rise somewhat, about one American in every eight or nine will be over 65. If life expectancy increases as we expect, then there will be close to one additional American over 65 for every eight who would survive without any increase in life expectancy--an additional 4 million people.

Conservative estimates of future birth rate imply that these roughly 37 million Americans over 65 will be approximately 14% of the total population. Another way to look at these same projections is to note that in 1975 the average age of Americans was 32.7; without any change in life expectancy, the average American will be nearly two years older by the year 2000. If birth rates do not rise precipitously, then the anticipated drop in death rates would raise the average age another two years to roughly 36.5.

The relations among the various aspects of the population projections, assuming that death rates decline as expected, may be clarified by Figure 2. In this figure, the horizontal axis represents age, the vertical axis represents population size, and the axis that extends inward into the plane of the page represents time--the year, starting with 1975 and going up to 2025 as the axis extends further inward below the surface of the page.

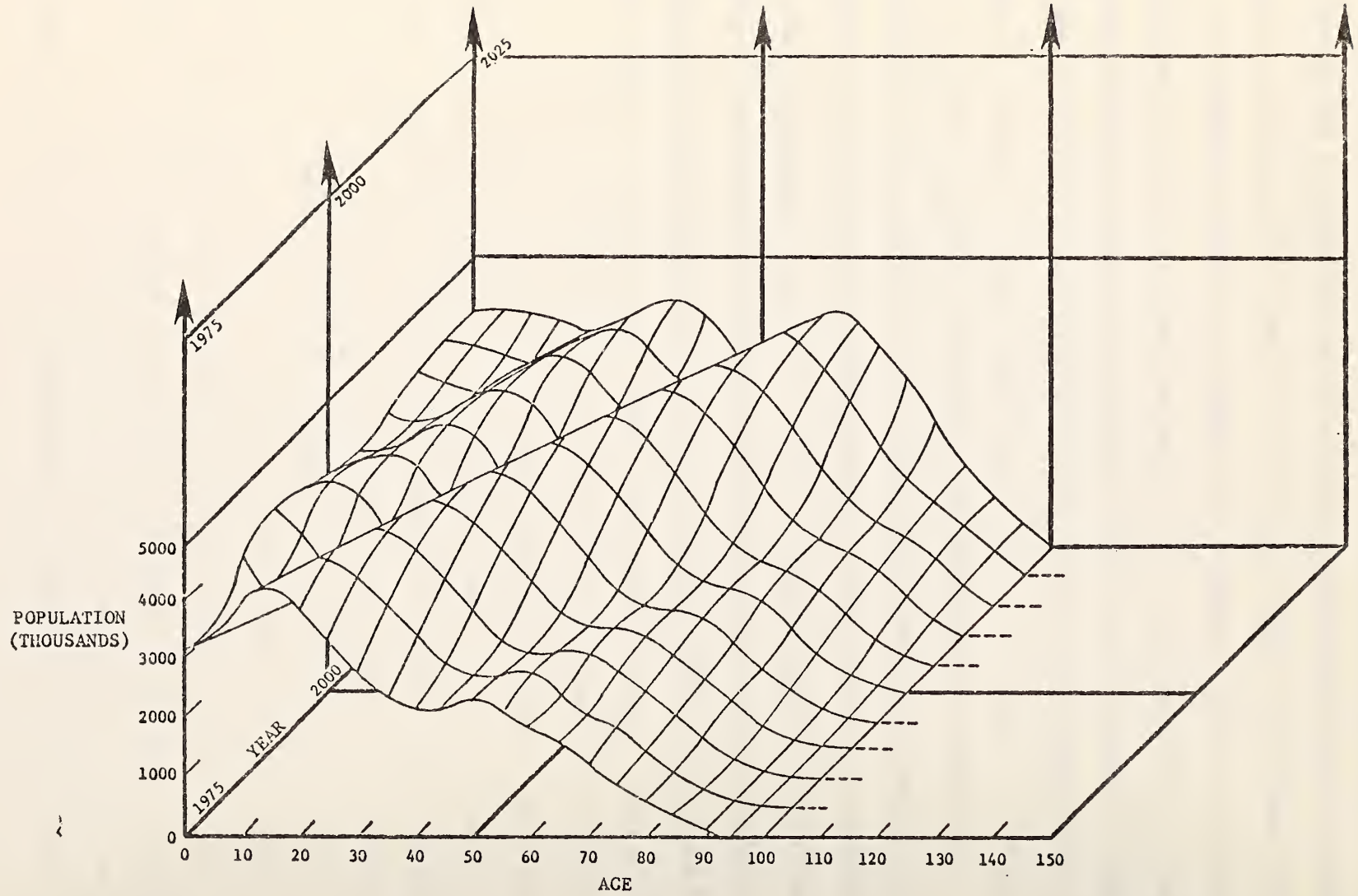


Figure 2. U.S. Population by Age and Year
With Predicted Death-Rate Declines 1/

Because people get one year older with each year that passes, following an age cohort in this figure requires proceeding diagonally rightward and inward. For example, the peak in the curve just over the word "YEAR" on the time axis corresponds to the baby-boom population peak in 1975. As this cohort grows older, the peak moves rightward and inward, forming the long diagonal fold in the population projection. Similarly, above and to the left of this fold is a second one due to family formation by the baby-boom generation. By the year 2025, there will be a new, third-generation peak emerging in the upper left corner of the projection.

It is striking how the projection in Figure 2 is dominated by the effects of the oscillation in birth rate, which causes alternate peaks and valleys in the projection. The main effect of the anticipated decline in death rates is to cause the population peak produced by the baby boom to persist without much attenuation for a longer time than have earlier population peaks, such as the one just barely detectable in the lower right portion of the projection.

SOCIAL SECURITY AND RETIREMENT

Long-range projections of the kind we have been reviewing have immediate practical consequences in planning for any services to the elderly. The problems of the Social Security system and its funding constitute a recent example of how legislation and financing are dependent on projections and assumptions about such future developments.

Long-range projections try to take into account such factors as the real wage, rate of inflation, population size, labor force size, and retirement and disability practices. The Advisory Council on Social Security (1975) made assumptions about all these in order to compute

the future status of Social Security. We will explore the picture that recently led to corrective legislation.

The main short-run concern of the Social Security retirement system is the predicted deficit of the trust fund that finances old age, survivors and disability insurance (OASDI). Unless the law was changed, the Advisory Council reported that the OASDI fund will be below 35% of one year's benefits by early 1978. The 1975 Annual Report of the OASDI trustees predicted that the fund would be exhausted shortly after 1979.

Projections to the year 2000 showed only a modest increase in the size of the Social Security program relative to the rest of the economy. The costs of OASDI and Railroad Retirement would amount to roughly 4.9% of gross national product (GNP), as compared to 4.4% in 1975.

The 1975 trustees' report projected that by the year 2000 OASDI expenditures would be 12% of taxable payroll; the tax rate would be only 9.9%. Therefore, there would be a 2.1% deficit. By the year 2025, with a tax rate of 11.9% OASDI expenditures would be about 20.45% of taxable payroll, implying a deficit of 8.55%.

These projections which did not assume any progress in life extension, could be adjusted to take into account expected progress, using the calculation:

$$\text{Expenditures as a percent of taxable payroll} = \frac{\text{Number of people receiving benefits} \times \text{(Average benefits)}}{\text{Number of people employed} \times \text{(Average covered wages)}} \times 100.$$

The variable in the calculation that reflects the effects of life extension most directly is the number of people receiving benefits, which we estimated from our guess about the number of people surviving past

retirement age. The number of people employed also depends--though to a lesser extent--on death rates, and this was also taken into account.

Assuming that the age of retirement would stay the same despite increased life expenctancy and that the ratio of average benefits to average covered wages also would stay the same, then by the year 2000 OASDI expenditures would be 13.3% of taxable payroll; the deficit would therefore be 3.4%, instead of the 2.1%, assuming no life extension. By the year 2025, assuming lower death rates, OASDI expenditures would be 29% of taxable payroll, implying a deficit of 17.1%.

If average retirement age continued to decline, then it would slip about five years per quarter century to 60 by the year 2000 and 55 by 2025. In such a case, the system would require a huge proportion of wages to be paid as payroll taxes in order to balance expenditures, whether or not the death rate declined as predicted.

With no change in life expectancy but with early retirement, by the year 2000 OASDI expenditures would be 16.5% of taxable payroll, for a deficit of 6.6%. By the year 2025, OASDI expenditures would reach 39%, for a deficit of 27%. If, along with early retirement, life expectancy went up as anticipated, then by the year 2000 OASDI expenditures would reach 18.2%, for an 8.3% deficit; by 2025 the expenditures would be a monstrous 43.3%, for a 31.4% deficit.

It is noteworthy that the effect of lowering the retirement age by five years per quarter century--not so large a shift--is appreciably greater than the effect of the anticipated change in life expectancy--about 6.5 years per quarter century. This is largely because the reduction in retirement age increases demand for benefits and reduces wage earnings for all those who retire because retirement age declined,

i.e., by the year 2025 all those aged 55-65; by contrast, increase in life expectancy adds demand for benefits for older persons, already retired.

Clearly, even with reduced death rates, there would be more younger people, below today's retirement age, than there would be older people past it. In addition, since increased life expectancy mainly affects the number of older persons, it has a much smaller impact on the amount of earnings contributions than does lowering retirement age.

Further, lower death rates for persons not yet retired increase, rather than decrease, income to the Social Security fund. Therefore, while lowering retirement age can only reduce fund income and increase fund liabilities, increased life expectancy has effects that work to cancel each other: though it increases fund liabilities to persons already retired, it also increases income from persons not yet retired.

Late in 1977, Congress took several actions to help "guarantee" the solvency of the system. Here are some of the actions:

1. It raised the base from $16,500 to $42,600 by 1987.
2. It raised the combined rate on employers and employees, from 11.7% to 15.3% by 1990. This and the base change will raise $227 billion by 1988.
3. It adjusted the formula that sets the ratio of benefits to earnings, so that benefits would not rise faster than inflation.
4. To rescue the disability portion of the system, it transferred money from a Medicare trust fund (which thus will be depleted in 10 years, a difficulty that may be dealt with through proposals for national health insurance).

But even as Congress made the changes, challenges to the meaning of its action, based on differing projections and assumptions, were made.

The Senate Finance Committee staff said the disability portion of the system was now "safe" through the year 2007, but the chairman of the House Ways and Means Committee was certain that Congress would have to return to the issue soon, and that still other sources of funding (such as contributions from general revenues) would be required.

HEALTH CARE

In recent years, the costs of health care increased and Americans also made increasing use of health services. Estimated per capita costs of personal health care in 1975 are about 1.6 times as high as they would have been had 1970 estimates simply been adjusted upward to reflect the 37.5% average rate of inflation in health care costs over the five-year interval.

Total estimated health-care costs in 1975 were $96.23 billion, of which $22.79 billion is estimated to be for persons aged 65 and above. With no increase in life expectancy, the total is estimated to rise to $130.52 billion by the year 2000 and $163.18 billion by 2025. The corresponding estimates for persons 65 and older are $34.56 billion and $51.05 billion.

The impact of increased life expectancy on these costs will be very sensitive to the way that increased life expectancy is achieved. If one disregards (unrealistically) the costs of developing and implementing new biomedical technologies necessary for increased life expectancy and possible changes in costs due to substituting new technologies for present ones, then the total cost of health care declines with increased life expectancy. With the anticipated rise in life expectancy, the total cost for all ages in the year 2000 is estimated to be $122 billion and in 2025 $150 billion. The costs for persons 65 and older in these two years

under these assumptions is estimated to be $31.5 billion in 2000 and $54.5 billion in 2025.

Thus, under the assumptions stated above, the cost of health care for older Americans will at first decline with increasing life expectancy and later rise to more than what it would have been without the reduction in death rates.

However, the increase in health costs with increased life expectancy is to be attributed simply to the greater numbers of people who would survive to require health care in old age. The costs per capita in any one year are projected to decline--due to generally higher level of health. For the age group 65-69, per capita costs in 1975 were estimated at $830. With increasing life expectancy, these costs are projected to drop to $708 in the year 2000 and $535 in 2025. Corresponding per capita costs for the age group 95-99 are $1840 in 1975 and $1735 in both 2000 and 2025.

Estimation of absolute and per capita health costs involves so many judgmental factors, such as the definition of what is to be considered a health-care cost, that these estimates are to be considered in relationship to each other rather than in connection with their absolute values. They are benchmarks rather than predictions, even for the case in which no change in life expectancy is assumed. Key factors that are disregarded include costs of biomedical research, consumption, expenditure stimulated by any national health insurance, use of high technology, and preventive medicine.

The effects of life expectancy changes on the costs of health care may be put into clearer perspective if we think of personal health care costs for the elderly as having two main components: terminal costs,

associated with an individual's final illness, and chronic costs, associated with long-term illness or disability.

The projections given above assume that terminal costs will not be affected by increased life expectancy. However, increased use of high technology may lead to increases in these costs.

It was also assumed that the main life-expectancy increases in the next 50 years would affect mortality and morbidity only beyond age 40. Per capita costs are reduced by the anticipated technologies because they tend to delay the onset of chronic costs and curtail their duration. In effect, chronic costs tend to become merged with terminal costs, which would therefore be greater, but overall personal health care costs per person are reduced.

Also assumed is something that is only partly a biomedical matter, because it is also partly a matter of public policy. The projections are based on the assumption that life expectancy will not be raised by selective preservation of the terminal, most fragile, portions of an individual's life cycle.

The important implication is that unless new technologies actually roll back or reverse the trend toward increased likelihood of death as time passes, an individual's life expectancy at the end of the life cycle cannot be substantially extended. It is inconceivable that large numbers of very frail elderly could be kept alive for many years without in some way making them much less frail.

This argument should not be interpreted to mean that it would be impossible to use high technology to keep even severely debilitated persons alive for extended periods of time. It is clearly possible even now to keep persons who have undergone brain death "alive" for extended time periods. There is little likelihood, however, that it will be economically

feasible to maintain appreciable numbers of persons in this way.

Rather, the life extension envisioned in the present analysis involves intervention much earlier in the process of physiological decline at a point at which the costs of intervention are far lower. If--contrary to our expectations--radical life support is used extensively, its costs could overwhelm the projected drop in per capita health care costs, which are based on increased low-cost preventive measures involving such life style matters as diet and exercise.

SOCIAL IMPACTS

There will be social impacts in the next 25 years stemming from the increasing numbers and proportions of elder Americans, but these impacts will be essentially the same, regardless of whether or not death rates decline as anticipated. The anticipated increase in older Americans without any death rate decline will of itself be sufficient to give rise to most of the anticipated impacts.

The public has accepted stereotypes about the helplessness, illness, and incapacity of the elderly. Even though a larger proportion are ill or dependent than at the prime of life, most older persons are healthy and independent. Society should begin to become more aware of this in the next quarter century.

The expansion of the population of the elderly has occurred so rapidly and so recently that we have little social experience dealing with a large body of old people. It is not surprising, then, that there has been some social stress and considerable acceptance of myths about the elderly. The reality is so new that the data have scarcely had time for broad distribution.

We need and probably will develop a variety of social inventions to deal with the novel situation. With new social mechanisms we will become more comfortable with a large population of older people. A likely social invention is some measure of competence to do work, probably defined in terms of the particular work to be engaged in. This would provide an objective basis, other than chronological age, for determining retirement. Some fear this development might concentrate power in a bureaucracy of testers. Disputes about equity in such testing may be a source of continuing social tension and unrest, if related to racial or ethnic differences. The many medical problems of the elderly will favor increased concern with and demand for development of technologies to deal with them.

As displayed in Figure 2 above, the oscillation in birth rates will give rise to a series of alternating rises and falls in the numbers and proportions of older Americans. There will be corresponding rises and falls in the intensity of demands upon the systems that provide services to the elderly. The interval from crest to crest in this oscillation will be approximately one generation, and so there will be time to adjust to the variation. But it will require careful planning, particularly with respect to the career patterns of persons who work in providing services to the elderly.

It will be increasingly necessary to develop new communication channels between individuals and the many large bureaucratic organizations that will evolve to administer the services on which people will have to depend. Many old people will not avail themselves of services to which they are entitled if they are unable to cope with new and often changing bureaucratic requirements. Many will blame themselves and thus

internalize the social problem. Rather than feeling outrage, they will conclude that they are evidently not entitled to whatever benefits that prove too bureaucratically difficult to attain.

Increased life expectancy will tend to accentuate all these impacts, and it will increase age segregation through the formation of gray ghettos. If life expectancy rises, then it will become necessary to reduce the proportion of young people in society if the size of the population is to remain stable. Paradoxically, this might make the young more precious--because they would become a rarer commodity. Because there will be more aged, more services for them, and fewer people working to support more retired persons, age may become a significant basis for political conflict. Even though the overall dependency ratio will drop (because the increase in older Americans will be more than balanced by a decline in children due to the drop in the birth rate), it seems likely that many Americans will be less tolerant of taxation that goes to support older dependents, who may be strangers, than of direct contributions inside the family to the support of their own dependent children.

It is likely that retirement age will rise to at least 70 and that mandatory retirement will become less common. Unless there is considerable economic growth, this may lead to competition for jobs among the elderly, youth, women, and members of minority groups. There might be proposals to delay the entry of young people into the work force, but this would surely be strongly resisted. Families would generally find it stressful to be responsible for dependents in their 20's. There would be widespread, and very possibly well justified, concern that excessive delay in entering the world of work could make it difficult for young people later to be productive workers.

All these considerations will encourage a variety of measures designed to provide jobs for the elderly while not forcing other groups, and particularly the young, out of the labor force. This would involve various work-sharing systems, and generally blurring the distinction between the life cycle periods during which individuals today are educated, work, and then explore the possibilities of leisure. Increased life expectancy will favor increased automation so as to provide for the increased demand for the enlarged population of non-working elderly. It will also favor ways of organizing job tasks so that those who were marginally infirm or senile could nevertheless contribute productively.

The number of "orphaned" elderly will continue to increase, partly because of the low number of children produced by those who married during the 1930's. This will mean more demand for such provisions as foster care of the elderly, halfway houses and cooperatives for the elderly. Private charities will be increasingly replaced by personal efforts and government services.

The group with the greatest power over the elderly will be the government, personified by the service-providers in government bureaucracies. Next in power will be the medical community. The power various groups have over the elderly might be abused, particularly if social inventions do not build new safeguards.

There will continue to be stigma associated with age, in part stemming from the greater needs of the elderly for expensive services, and in part stemming from persistent stereotyping of the elderly as unattractive and unpleasant. Even though some of this stereotyping will start to weaken by the end of the next quarter century, it will be far from vanished.

Nevertheless, older people will feel less disgrace or stigma when they accept financial assistance and services. This is because the age cohorts presently middle-aged will age in a society in which it will be commonplace for the government to provide such services, unlike the life experiences of today's elderly.

Therefore, tomorrow's elderly will be less diffident about demanding services to be better managed and of higher quality. They will also be generally better educated and more experienced in political activism. However, there will be a real (but not a high-probability) possibility of "backlash" from younger, more self-sufficient members of society, because as older persons increasingly make special use of social services, other groups may come to resent the resultant economic burden. This backlash is not likely to prove politically effective, however, because it will be difficult for those groups representing such diverse interests as extreme radicals and libertarians to ally themselves effectively.

In a context of conflict and debate about the extent of public services to the elderly, services may increase for the very old, e.g., over-75, frail elderly, but may decrease for those not quite so old and in good health. Between these two groups there may begin to evolve an implicit social contract. Young-old people may contribute volunteer services to facilities that provide care for old-old people. By doing so, they will familiarize themselves with the facility that will later care for them, thus making that dependency relationship less threatening. There may also be an implied, though probably not explicit, "contract" between the young-old person and the facility: by providing volunteer services to today's old-old, the young-old person earns the right to such services later.

The mere increased numbers of the elderly will not be an effective political force in and of itself. Instead, the very universality of the aging process means that the aged include in their numbers representatives from all the diverse groups that make up society. The aged will continue to be divided by the same class, ethnic, regional, and sex differences that divide society as a whole.

If the aged do resolve their differences and get together politically, it will probably be by relying on an ideology that transcends age-group interests, such as an ideology calling for broadly interpreted constitutional or human rights for which all Americans would be eligible. For example, it might be argued that special services for the frail elderly were not only for the frail elderly but also for the frail of any age, whatever the cause or nature of the physical problem causing frailty.

The political mobilization of interest groups may be determined more by the generally accepted image of the state of society and the images of various policies than by the actualities. Therefore, aging control, though hardly likely to be practically significant in the next half century, may mobilize more interest group response, pro and con, than the larger and more immediate impact of disease control.

It is difficult to see what new factors could stop or slow the continuing decline in the importance of the traditional nuclear family. Commitment to and emotional dependence on the spouse will continue to decline. Women in particular will find a growing proportion of their life satisfactions outside of their marital or familial roles. Husbands will share more equally child rearing and other nurturant activities inside the family. With women out of the home more, a new child-care role may emerge for grandparents or other, unrelated old people. Such a

development could make many grandparents the anchors that keep a family from drifting apart. Nevertheless, despite all these changes, marriage will continue to be both the norm and the ideal in child rearing and sexual bonding. Single parents and fatherless families will continue to have lower status.

There will be more four-generation families. The gap between the oldest and youngest generations will often be too large to bridge, and the two middle generations will experience the most stress, with loyalties and obligations to the oldest and youngest family members competing. As older Americans increasingly will have experienced the sexual revolution while they were younger, extra-marital sexual activity among older persons should increase, and sexual liaisons may become more casual. With more vigorous oldsters, intergenerational marriages should increase in frequency. Since children of older parents are more likely to carry genetic defects, procedures such as amniocentesis followed by abortion of a defective embryo may become more common.

There will be continued attempts to make return to structured education attractive to older persons. Admissions requirements, curricula, testing procedures, and grading will all be adapted to the characteristics and needs of an aging student population. Higher education will be, therefore, increasingly non-residential and increasingly conducted in an urban setting. The rural, residential campus will be more and more a luxury for the well-to-do young. Books will be easier to read, and there will be much more electronic storage and retrieval of information. Older persons will have to be helped to accept and use such new systems.

These are some possibilities apparent in our "crystal ball." We are sure the crystals of others may well offer a different picture. But we are sure that major changes in the size and character of the elderly population will have a profound effect on the development of our country.

Reference Note

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